



اللائحة الداخلية للدراسات العليا  
بكلية الحاسبات والمعلومات  
جامعة المنصورة

تهدف كلية الحاسبات والمعلومات – جامعة المنصورة إلى تحقيق الأغراض الآتية:-

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**مادة (1)**

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أولاً: دبلوم

**مادة (2)**

**مادة (3)**

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**مادة (5)**

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**مادة (6)**

**مادة (7)**

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**مادة (8)**

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**مادة (9)**

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ثانياً : الماجستير

مادة (10)

مادة (11)

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مادة (12)

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**مادة (13)**

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**مادة (15)**

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**مادة (16)**



ثالثاً : الدكتـورة

مادة (17)

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مادة (18)

مادة (19)

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مادة (20)

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**مادة (21)**

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**مادة (22)**

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**مادة (23)**

## **ملحق (1)**

### **جداول مقررات الدراسات العليا**

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الكود	القسم العلمي	م
CS	علوم الحاسب	1
IS	نظم المعلومات	2
IT	تكنولوجيا المعلومات	3
OR	بحوث العمليات	4
MATH	الرياضيات والإحصاء	5

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## ماجستير علوم الحاسب

### تمهيدي

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي/ عملي	اعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	100	0	0	3	---	3	نظرية الحسابات	CS	6111
3	100	100	0	0	3	---	3	تحليل وتصميم الخوارزميات	CS	6112
3	100	100	0	0	3	---	3	مادة اختيارية - 1	----	----
	70	0	0	70	3	---	3	مشروع	CS	6114
	370	300			12	---	12	المجموع		
<b>الفصل الثاني</b>										
3	100	100	0	0	3	---	3	النظم الموزعة متقدم	CS	6121
3	100	100	0	0	3	---	3	ذكاء اصطناعي متقدم	CS	6122
3	100	100	0	0	3	---	3	مادة اختيارية - 2	----	----
	130	60 (مناقشة)	0	70	3	---	3	مشروع	CS	6124
	430	360			12	---	12	المجموع		

### المقررات الاختيارية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي/ عملي	اعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
3	100	100	0	0	3	---	3	نظم البرمجة المنطقية	CS	6001
3	100	100	0	0	3	---	3	معالجة اللغة العربية	CS	6002
3	100	100	0	0	3	---	3	بناء المترجمات متقدم	CS	6003
3	100	100	0	0	3	---	3	نظم التعلم الذكية	CS	6004
3	100	100	0	0	3	---	3	موضوعات مختارة في علوم الحاسب	CS	6005

## ماجستير نظم المعلومات

### تمهيدي

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي/ عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	100	0	0	3	---	3	نظرية قواعد البيانات	IS	6111
3	100	100	0	0	3	---	3	قواعد البيانات شبيهة التوجه - 1	IS	6112
3	100	100	0	0	3	---	3	مادة اختيارية - 1	----	----
	70	0	0	70	3	---	3	مشروع	IS	6114
	370	300			12	---	12	المجموع		
<b>الفصل الثاني</b>										
3	100	100	0	0	3	---	3	نظم المعلومات الموزعة	IS	6121
3	100	100	0	0	3	---	3	نظم الوسائط المتعددة متقدم	IS	6122
3	100	100	0	0	3	---	3	مادة اختيارية - 2	----	----
	130	60 (مناقشة)	---	70	3	---	3	مشروع	IS	6124
	430	360			12	---	12	المجموع		

### المقررات الاختيارية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي/ عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
3	100	100	0	0	3	---	3	نماذج واجهات الحاسبات	IS	6001
3	100	100	0	0	3	---	3	قواعد البيانات شبيهة التوجه - 2	IS	6002
3	100	100	0	0	3	---	3	نظم المعلومات الذكية	IS	6003
3	100	100	0	0	3	---	3	اكتشاف المعرفة في قواعد البيانات	IS	6004
3	100	100	0	0	3	---	3	موضوعات مختارة في نظم المعلومات	IS	6005



## ماجستير تكنولوجيا المعلومات

### تمهيدي

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي/ عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	100	0	0	3	---	3	علوم الإدراك	IT	6111
3	100	100	0	0	3	---	3	اتصالات الوسائط المتعددة	IT	6112
3	100	100	0	0	3	---	3	مادة اختيارية - 1	----	----
	70	---	---	70	3	---	3	مشروع	IT	6114
	370	300			12	---	12	المجموع		
<b>الفصل الثاني</b>										
3	100	100	0	0	3	---	3	المنطق الرياضي والغازي	MATH	6121
3	100	100	0	0	3	---	3	منظومات الزمن الحقيقي	IT	6122
3	100	100	0	0	3	---	3	مادة اختيارية - 2	----	----
	130	60 (مناقشة)	---	70	3	---	3	مشروع	IT	6124
	430	360			12	---	12	المجموع		

### المقررات الاختيارية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي/ عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
3	100	100	0	0	3	---	3	معالجة الصور الرقمية متقدم	IT	6001
3	100	100	0	0	3	---	3	توليد الكلام بواسطة الحاسب	IT	6002
3	100	100	0	0	3	---	3	التعرف على الكلام بواسطة الحاسب	IT	6003
3	100	100	0	0	3	---	3	الرؤية بالحاسب	IT	6004
3	100	100	0	0	3	---	3	موضوعات مختارة في تكنولوجيا المعلومات	IT	6005

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**دبلوم علوم الحاسب**  
**الفرقة الأولى**

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	70	15	15	5	2	3	برمجة الحاسبات	CS	5111
3	100	70	15	15	5	2	3	تراكيب حسابية غير متصلة	MATH	5112
3	100	70	15	15	5	2	3	طرق إحصائية	MATH	5113
3	100	70	15	15	5	2	3	مقدمة في علم النظم	IS	5114
3	100	70	15	15	5	2	3	رياضيات - 3	MATH	5115
	500				25	10	15	المجموع		
<b>الفصل الثاني</b>										
3	100	70	15	15	5	2	3	هياكل البيانات	CS	5121
3	100	70	15	15	5	2	3	تنظيم الحاسبات	CS	5122
3	100	70	15	15	5	2	3	تصميم منطقي	CS	5123
3	100	70	15	15	5	2	3	الاحتمالات والتوزيعات الإحصائية	MATH	5124
3	100	70	15	15	5	2	3	مفاهيم لغات البرمجة	CS	5125
	500				25	10	15	المجموع		

## دبلوم علوم الحاسب

### الفرقة الثانية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	70	15	15	5	2	3	هندسة البرمجيات - 1	CS	5211
3	100	70	15	15	5	2	3	نظم التشغيل - 1	CS	5212
3	100	70	15	15	5	2	3	تنظيم الحاسبات	CS	5213
3	100	70	15	15	5	2	3	نظم قواعد البيانات - 1	IS	5214
3	100	70	15	15	5	2	3	الذكاء الاصطناعي	CS	5215
	70	---	---	70	5	4	1	مشروع	CS	5216
	570				30	14	16	المجموع		
<b>الفصل الثاني</b>										
3	100	70	15	15	5	2	3	الرسم بالحاسب - 1	IT	5221
3	100	70	15	15	5	2	3	شبكات الحاسبات - 1	IT	5222
3	100	70	15	15	5	2	3	مادة اختيارية - 1	----	----
3	100	70	15	15	5	2	3	مادة اختيارية - 2	----	----
3	100	70	15	15	5	2	3	مادة اختيارية - 3	----	----
	130	60 (مناقشة)	---	70	5	4	1	مشروع	CS	5226
	630				30	14	16	المجموع		

## المقررات الاختيارية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
3	100	70	15	15	5	2	3	لغة التجميع	CS	5001
3	100	70	15	15	5	2	3	خوارزميات الرسوم الحاسوبية	CS	5002
3	100	70	15	15	5	2	3	البرمجة المنطقية	CS	5003
3	100	70	15	15	5	2	3	بناء المترجمات	CS	5004
3	100	70	15	15	5	2	3	نظم قواعد المعرفة	CS	5005
3	100	70	15	15	5	2	3	نظم التشغيل – 2	CS	5006
3	100	70	15	15	5	2	3	تعريب الحاسبات	CS	5007
3	100	70	15	15	5	2	3	موضوعات مختارة في علوم الحاسب	CS	5008
3	100	70	15	15	5	2	3	اتصال الإنسان بالحاسب	IT	5009
3	100	70	15	15	5	2	3	الشبكات العصبية	IT	5010

## دبلوم نظم المعلومات

### الفرقة الأولى

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	70	15	15	5	2	3	برمجة الحاسبات	CS	5111
3	100	70	15	15	5	2	3	مقدمة في تكنولوجيا المعلومات	IT	5112
3	100	70	15	15	10	4	6	إحصاء تطبيقي	MATH	5113
3	100	70	15	15	5	2	3	اقتصاديات المعلومات	IS	5114
	500				25	10	15	المجموع		
<b>الفصل الثاني</b>										
3	100	70	15	15	5	2	3	هياكل البيانات	CS	5121
3	100	70	15	15	5	2	3	تخزين واسترجاع المعلومات	IS	5122
3	100	70	15	15	5	2	3	نظم تشغيل	CS	5123
3	100	70	15	15	5	2	3	نظم المعلومات الجغرافية	IS	5124
3	100	70	15	15	5	2	3	مادة اختيارية – 1	-----	-----
	500				25	10	15	المجموع		

## دبلوم نظم المعلومات

### الفرقة الثانية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	70	15	15	5	2	3	الرسم بالحاسب - 1	IT	5211
3	100	70	15	15	5	2	3	نظم قواعد البيانات	IS	5212
3	100	70	15	15	5	2	3	تحليل وتصميم نظم	IS	5213
3	100	70	15	15	5	2	3	الذكاء الاصطناعي	CS	5214
3	100	70	15	15	5	2	3	مادة اختيارية - 2	----	----
	70	---	---	70	5	4	1	مشروع	IS	5216
	570				30	14	16	المجموع		
<b>الفصل الثاني</b>										
3	100	70	15	15	5	2	3	الوسائط المتعددة	IS	5221
3	100	70	15	15	5	2	3	شبكات الحاسبات	IT	5222
3	100	70	15	15	5	2	3	إدارة مراكز المعلومات	IS	5223
3	100	70	15	15	5	2	3	مادة اختيارية - 3	----	----
3	100	70	15	15	5	2	3	مادة اختيارية - 4	----	----
	130	60 (مناقشة)	---	70	5	4	1	مشروع	IS	5226
	630				30	14	16	المجموع		

## المقررات الاختيارية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
3	100	70	15	15	5	2	3	مصادر المعلومات	IS	5001
3	100	70	15	15	5	2	3	المعالجة الفنية للمعلومات	CS	5002
3	100	70	15	15	5	2	3	خدمات المعلومات	IS	5003
3	100	70	15	15	5	2	3	تصميم قواعد البيانات	IS	5004
3	100	70	15	15	5	2	3	معالجة البيانات في بيئة الشبكات المحلية	IS	5005
3	100	70	15	15	5	2	3	نظم ميكنة المكاتب	IS	5006
3	100	70	15	15	5	2	3	نظم دعم الفرار	IS	5007
3	100	70	15	15	5	2	3	موضوعات مختارة في نظم المعلومات	IS	5008
3	100	70	15	15	5	2	3	شبكات الحاسب	IT	5008
3	100	70	15	15	5	2	3	النظم الخبيرة	CS	5009



## دبلوم تكنولوجيا المعلومات

### الفرقة الأولى

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	70	15	15	5	2	3	برمجة الحاسبات	CS	5111
3	100	70	15	15	5	2	3	تراكيب حسابية غير متصلة	MATH	5112
3	100	70	15	15	5	2	3	طرق إحصائية	MATH	5113
3	100	70	15	15	5	2	3	مقدمة في علم النظم	IS	5114
3	100	70	15	15	5	2	3	رياضيات - 3	MATH	5115
	500				25	10	15	المجموع		
<b>الفصل الثاني</b>										
3	100	70	15	15	5	2	3	هياكل البيانات	CS	5121
3	100	70	15	15	5	2	3	تنظيم الملفات ومعالجتها	CS	5122
3	100	70	15	15	5	2	3	تصميم منطقي	CS	5123
3	100	70	15	15	5	2	3	الاحتمالات والتوزيعات الإحصائية	MATH	5124
3	100	70	15	15	5	2	3	معالجة الإشارات الرقمية متقدم	IT	5125
	500				25	10	15	المجموع		

## دبلوم تكنولوجيا المعلومات

### الفرقة الثانية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي/ عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	70	15	15	5	2	3	هندسة البرمجيات - 1	CS	5211
3	100	70	15	15	5	2	3	نظم التشغيل - 1	CS	5212
3	100	70	15	15	5	2	3	تنظيم الحاسبات	CS	5213
3	100	70	15	15	5	2	3	شبكات الحاسبات - 1	IT	5214
3	100	70	15	15	5	2	3	مادة اختيارية - 1	----	----
	70	---	---	70	5	4	1	مشروع	IT	5216
	570				30	14	16	المجموع		
<b>الفصل الثاني</b>										
3	100	70	15	15	5	2	3	نظم الرسم بالحاسب - 1	IT	5221
3	100	70	15	15	5	2	3	الوسائط المتعددة	IS	5222
3	100	70	15	15	5	2	3	مادة اختيارية - 2	----	----
3	100	70	15	15	5	2	3	مادة اختيارية - 3	----	----
3	100	70	15	15	5	2	3	مادة اختيارية - 4	----	----
	130	60 (مناقشة)	---	70	5	4	1	مشروع	IT	5226
	630				30	14	16	المجموع		

## المقررات الاختيارية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
3	100	70	15	15	5	2	3	التعرف على الأنماط	IT	5001
3	100	70	15	15	5	2	3	التعرف على الحروف	IT	5002
3	100	70	15	15	5	2	3	التعرف على الكلام وتوليده	IT	5003
3	100	70	15	15	5	2	3	التعامل مع الصور والرؤية بالحاسب	IT	5004
3	100	70	15	15	5	2	3	الواقف الافتراضي	IT	5005
3	100	70	15	15	5	2	3	هندسة المعلومات	IT	5006
3	100	70	15	15	5	2	3	الشبكات الرقمية للخدمات المتكاملة	IT	5007
3	100	70	15	15	5	2	3	شبكات المعلومات	IT	5008
3	100	70	15	15	5	2	3	تخطيط وتصميم شبكات المعلومات	IT	5011
3	100	70	15	15	5	2	3	موضوعات مختارة في تكنولوجيا المعلومات	IT	5012

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## الدبلوم المهني في تكنولوجيا المعلومات

### الفرقة الأولى

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	70	15	15	5	2	3	نظم التشغيل	CS	7111
3	100	70	15	15	5	2	3	مقدمة في نظم المعلومات	IS	7112
3	100	70	15	15	5	2	3	نظم الحاسبات	CS	7113
3	100	70	15	15	5	2	3	هياكل البيانات	CS	7114
	400				20	8	12	المجموع		
<b>الفصل الثاني</b>										
3	100	70	15	15	5	2	3	قواعد البيانات(1)	IS	7121
3	100	70	15	15	5	2	3	هندسة البرمجيات	CS	7122
3	100	70	15	15	5	2	3	أساسيات شبكات الحاسب	IT	7123
3	100	70	15	15	5	2	3	البرمجة الشبئية	CS	7124
	400				20	8	12	المجموع		

## الدبلوم المهني في تكنولوجيا المعلومات

### الفرقة الثانية

النهاية العظمى للدرجات					الساعات الأسبوعية			كود المقرر		
زمن الامتحان	مجموع	تحريري	شفهي / عملي	أعمال فصل	مجموع	تمرين	محاضرة	اسم المقرر	القسم العلمي	كود
<b>الفصل الأول</b>										
3	100	70	15	15	5	2	3	اتصالات البيانات	DIT	7211
3	100	70	15	15	5	2	3	تحليل وتصميم النظم	IS	7212
3	100	70	15	15	5	2	3	قواعد البيانات(2)	IS	7213
	70	---	---	70	5	4	1	المشروع	IT	7214
	370				20	10	10	المجموع		
<b>الفصل الثاني</b>										
3	100	70	15	15	5	2	3	برمجة صفحات الويب	IS	7221
3	100	70	15	15	5	2	3	نظم معلومات الوسائط المتعددة	IS	7222
3	100	70	15	15	5	2	3	الأعمال الالكترونية	IS	7223
	130	60 (مناقشة)	---	70	5	4	1	المشروع	IT	7224
	430				20	10	10	المجموع		

## ملحق (2) المحتوى العلمي للمقررات

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## 1- تمهيدى ماجستير: تخصص علوم الحاسب

<b>Course Code</b>	CS 6111
<b>Course Name</b>	Computability theory <span style="float: right;">نظرية الحسابات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	The course familiarizes students with what is meant by a function to be computable or a problem to be decidable. The course introduces different theorems for testing or generating computable function.
<b>Course Syllabus</b>	<p>Introduction to mathematical notation and terminology</p> <p>Introduction: algorithmically undecidable problems</p> <p>Register machines</p> <p>Universal register machine Undecidability of the halting problem</p> <p>Turing machines and the Church-Turing Thesis</p> <p>Primitive recursive functions.</p> <p>Partial recursive functions [2 lectures]</p> <p>Recursive and recursively enumerable sets</p> <p>Universal programs</p> <p>Complexity of computation</p>

<b>Course Code</b>	CS 6112
<b>Course Name</b>	Analysis and design of algorithms <span style="float: right;">تحليل وتصميم الخوارزميات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	The course introduces different common and advanced data structures. The course also emphasizes different techniques for algorithm analysis and design.
<b>Course Syllabus</b>	<p>Introduction to mathematical notation and terminology</p> <p>Foundations</p> <p>Sorting and Order Statistics</p> <p>Data Structures</p> <p>Advanced Design and Analysis Techniques</p> <p>Advanced Data Structures</p> <p>Graph Algorithms</p> <p>Selected Topics</p>

<b>Course Code</b>	CS 6114
<b>Course Name</b>	Project <span style="float: right;">المشروع</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Syllabus</b>	<p>The project is intended to give the student a chance to put to practical use all the knowledge acquired in his study since he started . It should end with a software package designed to fulfill a predefined task. Throughout the project, the student is encouraged to practice the good procedures needed in all phases of package development, analysis, design, implementation, testing, and deployment. The project may or may not include hardware design and implementation.</p>

<b>Course Code</b>	CS 6121
<b>Course Name</b>	Advanced distributed systems <span style="float: right;">النظم الموزعة المتقدمة</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	The course familiarizes students with the concept of distribution and dividing the work over many processors. The course studies both software and hardware issues of distribution.
<b>Course Syllabus</b>	Introducing distributed systems Reviewing networks Reviewing operating systems Synchronization, consistency and fault tolerance Security Practical distributed systems

<b>Course Code</b>	CS 6122
<b>Course Name</b>	Advanced Artificial intelligence (AI) <span style="float: right;">ذكاء اصطناعي متقدم</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	The course familiarizes students with advanced and modern concepts of Artificial intelligence (AI). The course focuses on AI as the study of agents.
<b>Course Syllabus</b>	Introduction to AI Problem solving agents Reasoning and Knowledge Practical applications of AI Data mining. Expert System Artificial Neural Networks (ANN) Robotics Computer vision

<b>Course Code</b>	CS 6124
<b>Course Name</b>	Project
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This is a continuation to the project of the first semester.

<b>Course Code</b>	CS 6001
<b>Course Name</b>	Logic programming systems <span style="float: right;">نظم البرمجة المنطقية</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	The course familiarizes students with the logic programming paradigm by exploiting its many useful features such as parallelism and declarative interpretation of logic programs.
<b>Course Syllabus</b>	Introduction to logic Declarative programming and PROLOG Visual prolog

	Parallel logic programming Constraint Logic Programming Advanced issues
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<b>Course Code</b>	CS 6002
<b>Course Name</b>	Arabic Language Processing <span style="float: right;">معالجة اللغة العربية</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	The course familiarizes students with different theories and techniques of Arabic language processing. The course also shows challenges and potentials.
<b>Course Syllabus</b>	Spoken Language Input Written Language Input Language Analysis and Understanding Language Generation Spoken Output Technologies Discourse and Dialogue Document Processing Multi-linguality and translation Multimodality

<b>Course Code</b>	CS 6003
<b>Course Name</b>	Advanced compiler construction <span style="float: right;">بناء المترجمات (متقدم)</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	The course familiarizes students with compilers
<b>Course Syllabus</b>	Introduction to programming language concepts Introduction to compiler construction Lexical Analysis Syntax Analysis Semantic Analysis Intermediate Code Generation Run-Time Environments Code Optimization and Code Generation

<b>Course Code</b>	CS 6004
<b>Course Name</b>	Intelligent learning systems <span style="float: right;">نظم التعلم الذكية</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	The course familiarizes students with different concepts and theories of machine learning.
<b>Course Syllabus</b>	What is Machine Learning? Supervised Learning Reinforcement Learning Unsupervised Learning

## 2- تمهیدی ماجستير: تخصص نظم المعلومات

<b>Course Code</b>	IS 6111
<b>Course Name</b>	Database Theory نظرية قواعد البيانات
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Advanced course focusing on the theoretical, mathematical foundations for database systems. Specific topics studied shall include core query language features, complexity of answering queries, and other classical problems such as constraint solving.
<b>Course Syllabus</b>	<p>Refreshing, extension and formalization of basic concepts and mathematics from earlier courses: Relational algebra, tuple calculus, and domain calculus. Functional dependencies, axioms and deduction rules for these. Lower normal forms, theorems and proofs concerning normal forms. Algorithms for normalization.</p> <p>General dependencies: Multi-valued dependencies, join dependencies, axioms and deduction rules.</p> <p>Higher normal forms: Theorems and proofs. Algorithms for normalization to higher normal forms.</p> <p>Transitive closures and their use: Connection to the normal forms. Algorithms to compute transitive closures and for the verification of normalized structures.</p> <p>Formalization of non-normalized structures: Extensions and generalizations of the relational model and the formalizations related to it.</p> <p>Introduction to models: The relational model; the nested relational model, functional and logical models, object models. The mathematical foundation for the different models. Generalization of the concept of a model.</p> <p>Optimization: Mathematical principles for query optimization. Cost functions.</p>

<b>Course Code</b>	IS 6111
<b>Course Name</b>	Database Theory نظرية قواعد البيانات
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Advanced course focusing on the theoretical, mathematical foundations for database systems. Specific topics studied shall include core query language features, complexity of answering queries, and other classical problems such as constraint solving.
<b>Course Syllabus</b>	<p>Refreshing, extension and formalization of basic concepts and mathematics from earlier courses: Relational algebra, tuple calculus, and domain calculus. Functional dependencies, axioms and deduction rules for these. Lower normal forms, theorems and proofs concerning normal forms. Algorithms for normalization.</p> <p>General dependencies: Multi-valued dependencies, join dependencies, axioms and deduction rules.</p> <p>Higher normal forms: Theorems and proofs. Algorithms for normalization to higher normal forms.</p> <p>Transitive closures and their use: Connection to the normal forms. Algorithms to compute transitive closures and for the verification of normalized structures.</p> <p>Formalization of non-normalized structures: Extensions and generalizations of the relational model and the formalizations related to it.</p>

	Introduction to models: The relational model; the nested relational model, functional and logical models, object models. The mathematical foundation for the different models. Generalization of the concept of a model. Optimization: Mathematical principles for query optimization. Cost functions.
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<b>Course Code</b>	IS 6112
<b>Course Name</b>	Object Oriented Databases – 1 قواعد البيانات شبيهة التوجه- 1
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course aims at helping students understand how to develop an application using an advanced database system (an object-relational database system, an object-oriented database system, or an active database system)
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• <i>Refreshing, extension and formalization of basic concepts in object oriented programming and relational databases.</i> Classes, objects, inheritance, polymorphism, encapsulation, static and dynamic binding, message sending, relational mathematics, normal forms.</li> <li>• <i>Handling of non-normalized structures.</i> Extensions and generalizations of the relational model and the corresponding mathematics, modeling.</li> <li>• <i>Object management systems.</i> Concepts and problems.</li> <li>• <i>Persistent programming.</i> Methods and systems.</li> <li>• <i>Object database management systems.</i> Modeling, meta programming, transactions, garbage collection, query handling.</li> <li>• <i>Prototypes and user interfaces.</i></li> <li>• <i>Problems related to temporal and spatial aspects.</i></li> <li>• <i>Existing systems.</i> An overview of commercial as well as academic systems.</li> </ul>

<b>Course Code</b>	IS 6114
<b>Course Name</b>	Project المشروع
<b>Compulsory/Elective</b>	Compulsory
<b>Course Syllabus</b>	The project is intended to give the student a chance to put to practical use all the knowledge acquired in his study since he started . It should end with a software package designed to fulfill a predefined task. Throughout the project, the student is encouraged to practice the good procedures needed in all phases of package development, analysis, design, implementation, testing, and deployment. The project may or may not include hardware design and implementation.

<b>Course Code</b>	IS 6121
<b>Course Name</b>	Distributed Information Systems نظم المعلومات الموزعة
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course aimed to teach students various technologies and components which are Used for design and development of Distributed Information Systems (DIS).

<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Distributed Systems: Concepts and Design</li> <li>• Distributed Programming and Java/CORBA</li> <li>• Architectures of Platforms for Distributed Information Systems</li> <li>• Software Engineering and Middleware</li> <li>• Transactions, workflow and processes</li> <li>• Software Agents</li> <li>• Software Engineering for Mobility</li> <li>• Distributed processing and multimedia</li> <li>• Principled Design of the Modern Web Architecture</li> <li>• Agent-based approach to Modeling Virtual Enterprises</li> </ul>
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<b>Course Code</b>	IS 6122
<b>Course Name</b>	Advanced Multimedia Systems نظم الوسائط المتعددة متقدم
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This is an advanced course in interactive multimedia applications development.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Multimedia Applications Development: Software evaluation criteria, Rapid prototyping, Development cycle Process, Documentation</li> <li>• The Business of Multimedia: Marketing, RFP's, grants, and bids, Estimating Contracts, Incorporation, Intellectual property law, Ethics</li> <li>• The Development Team: Multimedia skill sets, Group dynamics, Workflow management, Best practices</li> <li>• The Design of Interaction: Interface design guidelines, Metaphors, Flowchart, storyboard, GUI and icons, Navigation and controls, User help and dialogues, Simulations</li> <li>• Content: Static vs. dynamic, Narrative, Media assets, Archival vs. original content, Talent</li> <li>• Data: Capturing data, Data types and structures, Database design, Multimedia databases, Relational databases, Publishing databases on the web</li> <li>• Web-based Multimedia: Media integration, MIME types, Tables, style sheets, and layers, Forms, Javascript, Java applets, DHTML, Shockwave, SGML, HTML, XML, SMIL, SVG</li> <li>• Shrink-wrapped Multimedia: Rich media, Formats, requirements, and production methods</li> <li>• Distributed Multimedia: Multiplayer games, Computer-supported collaborative work</li> <li>• Advanced Programming: Maintaining State, Bookmarking, File I/O, CGI, System calls, Control of applications, peripherals, and system resources, Network access and telephony, Testing &amp; Debugging, Run-time debugging, Multiplatform support</li> <li>• Packaging and Delivery: Localization, Managing external assets, Compression, Gold master</li> </ul>

<b>Course Code</b>	IS 6124
<b>Course Name</b>	Project
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This is a continuation to the project of the first semester.

<b>Course Code</b>	IS 6001
<b>Course Name</b>	Computer Interface Models نماذج واجهات الحاسبات
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	Presents a comprehensive introduction to the principles and techniques of human computer interaction and user interface.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Overview of the process of user-oriented design</li> <li>• User requirements modelling</li> <li>• Socio-technical models</li> <li>• Soft systems methodology</li> <li>• Applying design guidelines</li> <li>• Determining user properties and requirements</li> <li>• Analyzing and formally describing users' performance of tasks</li> <li>• Testing aspects of a design empirically</li> <li>• Designing help and documentation</li> <li>• Social and organizational aspects of interface design</li> <li>• Usability aspects of systems that support communication and collaboration</li> <li>• Organizational issues related to usability</li> </ul>

<b>Course Code</b>	IS 6002
<b>Course Name</b>	Object Oriented Databases – 2 قواعد البيانات شبيهة التوجه- 2
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	Advanced topics in Object-Oriented and Object-Relational Database Systems
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Object-Oriented Database Systems (OODBMS) <ul style="list-style-type: none"> <li>○ The Object-Oriented Data Model</li> <li>○ Complex Types and Object-Oriented in Database Systems</li> <li>○ Query Processing in OODBMS</li> <li>○ Storage Structures for OODBMS</li> <li>○ The ODMG Standard</li> </ul> </li> <li>• Object-Relational Database Systems <ul style="list-style-type: none"> <li>○ Object-Relational Data Models</li> <li>○ User-Defined Types and Functions</li> <li>○ Query Processing</li> <li>○ Object-Relational System Architectures</li> <li>○ The SQL3 standard</li> </ul> </li> </ul>

<b>Course Code</b>	IS 6003
<b>Course Name</b>	Intelligent Information Systems نظم المعلومات الذكية
<b>Core/Elective</b>	Core
<b>Course Description</b>	The purpose of this course is to provide the student with a detailed understanding of the concepts behind data analysis, information extraction and knowledge construction via the general approaches of machine learning.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Introduction and overview of machine learning</li> <li>• Theory of Induction</li> <li>• Empirical Evaluation: Assessing performance of learning systems</li> <li>• Unsupervised Learning and Clustering</li> <li>• Case-Based Reasoning, Instance based learning</li> <li>• Kohonen Self-Organizing Maps</li> <li>• Symbolic Systems: Rule-Based</li> <li>• Symbolic Systems: Frame-Based</li> <li>• Decision Trees</li> <li>• Fuzzy Sets and Fuzzification</li> <li>• Biological and artificial neurons</li> </ul>

	<ul style="list-style-type: none"> <li>• Principles of Evolution</li> <li>• Genetic Algorithms</li> <li>• Representations for evolution: ES, EP &amp; GP</li> <li>• Applications of EA – hybrid systems</li> <li>• Local versus Global modeling</li> <li>• SOM-MLR: A local topological modeling system</li> <li>• Bayesian Learning</li> <li>• Applications of Intelligent information systems</li> </ul>
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<b>Course Code</b>	IS 6004
<b>Course Name</b>	Knowledge Discovery in Databases اكتشاف المعرفة في قواعد البيانات
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	Knowledge Discovery in Databases (KDD) is a new multidisciplinary field. Its main focus is the automated extraction of patterns representing knowledge implicitly stored in large databases, data warehouses, and other massive information repositories.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Introduction to knowledge discovery concepts</li> <li>• Data warehousing, OLAP and analysis and mining of data warehouses</li> <li>• Overview of Basic Data Mining Techniques</li> <li>• Mining Data Streams</li> <li>• Relational Data Mining</li> <li>• Tree/Graph Mining</li> <li>• Spatiotemporal Data Indexing and Mining</li> <li>• Privacy-preserving Data Mining</li> <li>• Similarity Search</li> <li>• High-Dimensional Data Clustering</li> <li>• Social Network and Linkage Analysis</li> </ul>



### 3- تمهيدى ماجستير: تخصص تكنولوجيا المعلومات

<b>Course Code</b>	IT 6111
<b>Course Name</b>	Cognitive Sciences علوم الإدراك
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course offers an introduction to this science and shows the relationships between Cognitive Science and AI. Although the course concentrates on the connectionist approach to cognitive science presenting major types of neural networks and relating each to brain function and cognitive behaviour, an introduction to expert systems as symbolic computational cognitive science is also presented.
<b>Course Syllabus</b>	<ol style="list-style-type: none"> <li>1. Cognitive science: a true interdisciplinary field.</li> <li>2. Knowledge Representation: Logic, Rule-based systems and others</li> <li>3. Neural Networks and Connectionism</li> <li>4. The Brain</li> <li>5. Memory and Learning: Concepts and Models</li> <li>6. Language: Acquisition and Evolution</li> <li>7. Human Information Processing</li> <li>8-9. Consciousness, Emotions and Subconsciousness</li> </ol>

<b>Course Code</b>	IT 6112
<b>Course Name</b>	Multimedia Communications إتصالات الوسائط المتعددة
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	The course provides an overview of multimedia applications and system requirements, focussing on technology issues that remain to be resolved before services such as video-on-demand, video telephony, and content-based retrieval can be widely deployed. Students learn to design and analyze contemporary data network architectures and protocols. The JPEG image compression standard is studied in detail, and students gain the ability both to encode and to decode JPEG compliant data streams. Leveraging on the students' thorough understanding of JPEG, the H.263 and MPEG video coding standards are covered more rapidly.
<b>Course Syllabus</b>	<ol style="list-style-type: none"> <li>1. Multimedia applications and system requirements</li> <li>2. Packet switching and circuit switching</li> <li>3. The ISO-OSI layered network architecture</li> <li>4. Modulation techniques</li> <li>5. Error control coding</li> <li>6. DLC protocols and framing</li> <li>7. End-to-end error recovery and flow control</li> <li>8. Signal compression techniques</li> <li>9. JPEG</li> <li>10. Motion compensation</li> <li>11. H.263 and MPEG video coding</li> <li>12. Survey of contemporary applications</li> </ol>

<b>Course Code</b>	IT 6114
<b>Course Name</b>	Project <span style="float: right;">المشروع</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Syllabus</b>	The project is intended to give the student a chance to put to practical use all the knowledge acquired in his study since he started . It should end with a software package designed to fulfill a predefined task. Throughout the project, the student is encouraged to practice the good procedures needed in all phases of package development, analysis, design, implementation, testing, and deployment. The project may or may not include hardware design and implementation.

<b>Course Code</b>	IT 6121
<b>Course Name</b>	Mathematical and Fuzzy Logic <span style="float: right;">المنطق الرياضى والغازى</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course is an introduction to fuzzy logic and fuzzy set theory. Topics will include the mathematical foundations of fuzzy sets, properties of fuzzy systems, fuzzy logic as applied to the design of intelligent systems and for intelligent control, adaptive fuzzy systems, and others. Numerous applications of fuzzy logic will be discussed
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Introduction to Fuzzy Sets</li> <li>• Concepts of Fuzzy Theory</li> <li>• Real-World Applications</li> <li>• The Basic Fuzzy Set Theory</li> <li>• Fuzzy Decision Making</li> <li>• Fuzzy Quantification Theory</li> <li>• Fuzzy Mathematical Programming: Linear Programming, Multiple</li> <li>• Objective Linear Programming and Multi-Level Programming</li> </ul>

<b>Course Code</b>	IT 6122
<b>Course Name</b>	Real-Time Systems <span style="float: right;">منظومات الزمن الحقيقى</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course will introduce the students to the design and implementation of real-time systems, including both hardware and software issues.
<b>Course Syllabus</b>	Introduction to real-time systems, real-time scheduling including multiprocessor scheduling, real-time operating systems (kernels), real-time communication, real-time programming languages, reliability and fault-tolerance, and real-time system requirements and design methods. Design, analysis, and implementation of real-time kernel mechanisms and real-time applications.

<b>Course Code</b>	<b>IT 6124</b>
<b>Course Name</b>	<b>Project</b>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This is a continuation to the project of the first semester.

<b>Course Code</b>	IT 6001
<b>Course Name</b>	Advanced Digital Image Processing معالجة الصور الرقمية متقدم
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course covers the advanced research topics of image processing which include image digitization, description, enhancement, segmentation, image transforms, filtering, restoration, coding and retrieval. Students are encouraged to collect and evaluate recently published articles in the above general areas.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Image Perception</li> <li>• Two dimensional Sampling Theory</li> <li>• Image Quantization</li> <li>• Two Dimensional Orthogonal and Unitary Transform</li> <li>• Properties of Unitary Transforms</li> <li>• Discrete Fourier Transform, an overview</li> <li>• Discrete Cosine Transform</li> <li>• Discrete Sine Transform</li> <li>• The Haar Transform</li> <li>• The KL Transform</li> <li>• The Wavelet Transform</li> <li>• Image Representation and Modeling</li> <li>• Discrete Random Fields</li> <li>• Spatial Operations</li> <li>• Generalized Filtering</li> <li>• Multispectral and Color Image Enhancements</li> <li>• Deconvolution</li> <li>• Applications of Neural and Cellular neural networks in image processing.</li> </ul>

<b>Course Code</b>	IT 6002
<b>Course Name</b>	Computer Speech Synthesis توليد الكلام بواسطة الحاسب
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	An overview of the electronically produced/processed voice, with exploration of: human speech/singing formants; time-stretching and granular speech techniques; human singing voice synthesis software; introduction to convolution of the human voice; introduction to the mechanics of human voice sound production. Formant synthesis: singing and speech synthesis based on frequency domain techniques such as vocoding, parametric EQ, and use of formant filters. In addition to classroom time, students will be supervised in weekly hands-on practice in this synthesis lab. The course requires production of a composition, soundscape, etc.
<b>Course Syllabus</b>	<ol style="list-style-type: none"> <li>1. Human speech apparatus: voiced and unvoiced mechanics</li> <li>2. Formants in the human voice</li> <li>3. Synthetic vowel production using various synthesis platforms: parametric EQ, Bandpass Filters, vocoding, vowel filters, Vokator, Aural.</li> <li>4. Survey of current speech/vocal synthesis, pop to avant-grade</li> <li>5. Oscilloscope/spectrum analyzer and waterfall signal/sound studies with emphasis on understanding formant structures</li> </ol>

<b>Course Code</b>	IT 6003
<b>Course Name</b>	Computer Speech Recognition      التعرف على الكلام بواسطة الحاسب
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course aims to provide theoretical foundations and practical experience in computer speech processing and recognition. Many of the techniques and algorithms covered under the course are applicable to a variety of areas concerned with recognizing sequences.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>○ Introduction. Spoken Language Structures.</li> <li>○ Speech Processing. Automatic Speech Recognition.</li> <li>○ Pattern Recognition. Hidden Markov Models.</li> <li>○ Statistical Language Models. Natural Language Processing.</li> <li>○ Natural Language Generation. Text-to-Speech Synthesis.</li> <li>○ Prosody and Expressivity. Dialog Modeling.</li> <li>○ Case Studies of Spoken Language Systems. Evaluation Methodologies.</li> <li>○ Spoken Audio Processing for Audio Document Retrieval.</li> <li>○ Query Processing for Audio Document Retrieval.</li> <li>○ Retrieval Models. Performance Evaluation</li> </ul>

<b>Course Code</b>	IT 6004
<b>Course Name</b>	Computer Vision      الرؤية بالحاسب
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course covers important aspects and recent advances of computer vision through papers in the literature. By formulating computer vision as a statistical inference process, computational approaches to vision and their elements are presented and analyzed. Topics include Marr's computational vision paradigm, feature extraction principles, classification algorithms, Bayesian inference framework for vision, pattern theory, and visual learning theories.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>● Introduction</li> <li>● Mathematical formulations of computer vision problems.</li> <li>● Representations and features in computer vision.</li> <li>● Classification algorithms.</li> <li>● Computational approaches to vision.</li> <li>● Grenander's Pattern Theory.</li> <li>● Spring break.</li> <li>● 3D vision</li> <li>● Approaches to invariant object recognition.</li> <li>● Implementation issues in computer vision.</li> <li>● Current and future research directions in computer vision</li> </ul>

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## 1- دبلوم علوم الحاسب

<b>Course code</b>	CS 5111
<b>Course name</b>	Computer programming <span style="float: right;">برمجة الحاسبات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with programming languages, focusing on a particular modern computer programming language.
<b>Syllabus</b>	Introduction Control Statements Methods Arrays Object-Oriented Programming Selected topics [optional]

<b>Course code</b>	MATH 5112
<b>Course name</b>	Discrete Computational Structures <span style="float: right;">تراكيب حسابية غير متصلة</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	To study different models for computing devices (the automata), their limitations and relationships to formal languages, and some applications of these computational models.
<b>Syllabus</b>	Introduction Regular Expressions Finite Automata Transition Graphs Nondeterministic Finite Automata Regular and Non-Regular Languages Finite Automata with Output Context-Free Grammars & Grammatical Format Pushdown Automata & CFG $\equiv$ PDA Turing Machines

<b>Course code</b>	MATH 5113
<b>Course name</b>	Statistical methods <span style="float: right;">طرق إحصائية</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with statistics showing the power of application in life and computer science.
<b>Syllabus</b>	Introduction to Statistics Data grouping Measures of Relative Standing Estimation Hypothesis Tests Regression Selected topics [optional]

<b>Course code</b>	IS 5114
<b>Course name</b>	Introduction to Information systems <span style="float: right;">مقدمة في علم النظم</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The goal of this course is to present a core of IS principles with which every information science student should be familiar and to study real cases that are associated with IS applications in order to understand the issues in IS disciplines. It will also give learning opportunity to realize the changing role of the IS professional and show the value of the discipline as an attractive field of specialization.
<b>Syllabus</b>	Information Systems in Organizations Hardware: Input, Processing, and Output Devices Software: Systems and Application Software Organizing Data and Information Telecommunications and Networks The Internet, Intranets, and Extranets Electronic Commerce Transaction Processing and Enterprise Resource Planning Systems Information and Decision Support Systems Specialized Business Information Systems: Artificial Intelligence, Expert Systems, Virtual Reality, and Other Specialized Systems Systems Investigation and Analysis Systems Design, Implementation, Maintenance, and Review Security, Privacy, and Ethical Issues in Information Systems and the Internet

<b>Course code</b>	MATH 5115
<b>Course name</b>	Mathematics (3) <span style="float: right;">رياضيات (3)</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with various set of topics which form as a basis of many algorithms and problem solving in mathematics and computer science.
<b>Syllabus</b>	Logic Set theory Number Theory Mathematical Induction Counting Functions Relations Selected topics [optional] Graph Theory

<b>Course Code</b>	CS 5121
<b>Course Name</b>	Data Structures <span style="float: right;">هياكل البيانات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course introduces the fundamental concepts of data structures and the algorithms that proceed from them, the file system fundamentals, and developing skills in the design and implementation of complex software systems.
<b>Course Syllabus</b>	Secondary Storage Devices Stacks, Queues, Linked Lists, Double-Ended Queues .

	<p>Sequences (Ranked Sequences, Positional Sequences, General Sequences) .</p> <p>Trees (Binary Trees, Data Structures for Representing Trees) .</p> <p>Priority Queues (Priority Queue as a Sequence, Heaps).</p> <p>Dictionaries (Binary Search Trees, AVL Trees, Hash Tables).</p> <p>Sets, Sorting, Selection (Sets, Merge Sort, Quick Sort, Radix Sort Complexity of Sorting, Selection).</p> <p>Graphs (Data Structures for Graphs, Graph Traversal, Directed Graphs).</p> <p>Strings (Brute-Force String Pattern Matching, Regular Expression Pattern Matching, Tries).</p> <p>Record Storage and File Organizations (ordered and unordered files).</p> <p>Hashing and extendible hashing.</p> <p>Index structures for files (B-Trees, B+-Trees).</p>
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<b>Course code</b>	CS 5122
<b>Course name</b>	File Organization and Processing <span style="float: right;">تنظيم الملفات ومعالجتها</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	<p>This class will provide the skills to: Enable the analysis of the trade-offs of the data-handling needs of a particular problem situation. Also to select the appropriate data structure or file organization.</p> <p>Students will understand what in general is going on in the computer both in the active main memory data structure part, as well as in the auxiliary data part of the computer.</p>
<b>Syllabus</b>	<p>Introduction to File Structures</p> <p>Fundamental File Processing Operations</p> <p>Secondary Storage and System Software</p> <p>Fundamental File Structure Concepts</p> <p>Managing Files and Records</p> <p>Indexing</p> <p>Sequential Processing and the Sorting of Large Files</p> <p>Multilevel Indexing and B-Trees</p> <p>Indexed Sequential File Access and Prefix B+ Trees</p> <p>Hashing</p> <p>Extendible Hashing</p> <p>SELECTIVELY,</p> <p style="text-align: center;">Case study reading and writing in files using C++, VB, and/or Pascal</p>

<b>Course code</b>	CS 5123
<b>Course name</b>	Logic Design <span style="float: right;">تصميم منطقي</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Credits</b>	Theory: 2      Project: 1      Lab: 2      TOT: 3
<b>Description</b>	<p>The course introduces the fundamental concepts of digital systems .</p> <p>As well as Number systems, Boolean and switching algebra.</p> <p>Combinational logic circuits (analysis and design) , vs. Sequential logic circuits (analysis and design).</p>
<b>Syllabus</b>	<p>Binary Systems:</p> <p>Boolean Algebra and Logic Gates:</p> <p>Gate Level Minimization</p> <p>Combinational Logic Design:</p> <p>Synchronous Sequential Logic:</p> <p>Registers and Counters</p>



<b>Course code</b>	MATH 5124
<b>Course name</b>	Probability and Statistical distributions الإحتمالات والتوزيعات الإحصائية
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with probability showing the power of application in life and computer science.
<b>Syllabus</b>	Introduction to Probability Combinatorics Conditional Probability Random Variables Expected Value and Variance Discrete Probability Distributions Continuous Probability Densities Generating Functions Selected topics [optional]

<b>Course code</b>	CS 5125
<b>Course name</b>	Principles of Programming Languages مفاهيم لغات البرمجة
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	This course will cover important concepts behind modern programming languages such as Java and ML. After taking this course, you will be able to: Understand better the strengths and limitations of languages you use already; Teach yourself new languages with relative ease.
<b>Syllabus</b>	Introduction Programming language syntax Names, scopes and bindings Semantic analysis Control flow Subroutines and control abstraction Implementation of subroutines incl. closures Intro to types Type equality, subtyping, information hiding. Case studies of types: Modula-3 Object orientation: basic concepts Object orientation case study: Java Functional programming languages Exception handling Garbage collection

<b>Course code</b>	CS 5211
<b>Course name</b>	Software engineering-1 هندسة البرمجيات-1
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with classical and modern concepts of Software engineering.
<b>Syllabus</b>	Introduction to Software engineering Software models Requirements specification Software analysis Development Object-oriented design and UML Software testing

<b>Course code</b>	CS 5212
<b>Course name</b>	Operating systems-1 نظم التشغيل-1
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with the concept of operating system. The course studies both historical and implementation issues.
<b>Syllabus</b>	Introducing operating system Operating systems structure Process management CPU scheduling Memory management

<b>Course code</b>	CS 5213
<b>Course name</b>	Computer organization تنظيم الحاسبات
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	This course provides a programmer's view of how computer systems execute programs, store information, and communicate. It enables students to become more effective programmers Topics covered include: machine-level code and its generation by optimizing compilers, performance evaluation and optimization, computer arithmetic, memory organization and management.
<b>Syllabus</b>	Course Overview - Tour of Computer Systems. Representing & Manipulating Information Machine-Level Representation of Programs Memory Hierarchy. Virtual Memory. (Chapter 10) Measuring Program Execution Time. Exceptions Processes. Concurrent Programming. System-Level I/O. Network Programming

<b>Course code</b>	IS 5214
<b>Course name</b>	Database systems – 1 نظم قواعد البيانات- 1
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with theoretical and applied concepts of Database systems.
<b>Syllabus</b>	Introduction to Database systems Relational model Relational algebra Database normalization SQL Case study SQL server 2000 or Microsoft Access Object-oriented database [optional]

<b>Course code</b>	CS 5215
<b>Course name</b>	Artificial intelligence(AI) <span style="float: right;">الذكاء الاصطناعي</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with classical and modern concepts of Artificial intelligence(AI). The course focuses on AI as the study of agents.
<b>Syllabus</b>	Introduction to AI Problem formulation. Uninformed search strategies Constraint satisfaction problems(CSP) Informed search strategies Local search algorithms Game Playing (Adversarial Search) Reasoning and Knowledge Expert System

<b>Course Code</b>	CS 5216
<b>Course Name</b>	Project <span style="float: right;">المشروع</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Syllabus</b>	The project is intended to give the student a chance to put to practical use all the knowledge acquired in his study since he started . It should end with a software package designed to fulfill a predefined task. Throughout the project, the student is encouraged to practice the good procedures needed in all phases of package development, analysis, design, implementation, testing, and deployment. The project may or may not include hardware design and implementation.

<b>Course code</b>	IT 5221
<b>Course name</b>	Computer graphics-1 <span style="float: right;">الرسم بالحاسب-1</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	Hardware and software components of graphics systems. Output and filled data primitives. 2D and 2D geometric transformations. Two dimensional viewing: viewing pipeline, clipping, and windowing. Three dimensional viewing: viewing pipeline, viewing parameters, projections, viewing transformations, clipping, visible surface detection. Introduction to illumination models and surface rendering.
<b>Syllabus</b>	Introduction. Output primitives (DDA, Bresenham's, circle and generating algorithms). Introduction to the practical use of OpenGL. Filled area primitives 2D and 3D geometric transformations. Two-dimensional viewing. Three-dimensional object representations Three-dimensional viewing Visible surface detection (back face, depth buffer, depth sorting) Illumination models, and surface rendering

<b>Course code</b>	IT 5222
<b>Course name</b>	Computer networks-1 شيكات الحاسب - 1
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course introduces the networking to the students.
<b>Syllabus</b>	Introduction : definition and topologies The OSI model The Link Layer Booting The Internet Protocol Routing and Dynamic Routing Name Services Spring Recess TCP vs. UDP Security [optional] Networked File Systems Applications [optional] Building Applications DNS [optional] Ether net [optional]

<b>Course Code</b>	CS 5226
<b>Course Name</b>	Project
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This is a continuation to the project of the first semester.

<b>Course code</b>	CS 5001
<b>Course name</b>	Assembly Language لغة التجميع
<b>Compulsory/Elective</b>	Elective
<b>Description</b>	Each student will gain an understanding of basic computer architecture, with emphasis on PC architecture. Students will have knowledge of CPUs, BIOS, Interrupts, addressing, memory management, types of disk drives, types of busses, video cards, modems, network cards, hardware compatibility issues and basic digital circuit concepts. Students will also gain a familiarity with Assembler programming with emphasis on the Intel family of processors through lecture and programming projects
<b>Syllabus</b>	Introduction to PC Hardware PC Software Requirement Execution of Instruction Assembly Language Requirement Assembling, Linking, and Executing a Program Processor Instruction and Addressing Writing .COM Programs Processing Binary Data Introduction to Screen and Keyboard Processing Program Logic and Control Calling Procedures and Parameter Passing

<b>Course code</b>	CS 5002
<b>Course name</b>	Algorithms of computer graphics خوارزميات الرسوم الحاسوبية
<b>Compulsory/Elective</b>	Elective
<b>Description</b>	This class will introduce programming techniques for the interactive display of two and three dimensional objects.
<b>Syllabus</b>	<p>Why C? Intro to C and pointers.  Graphics Systems and Models and Graphics Programming  Geometric Objects and Transformations  Viewing and camera  Lighting and shading  Development with OpenGL  From Vertices to Fragments  Curves  Principles of Traditional Animation  3D Computer Animation  Fractals [optional]</p>

<b>Course code</b>	CS 5003
<b>Course name</b>	Logic programming البرمجة المنطقية
<b>Compulsory/Elective</b>	Elective
<b>Description</b>	The course familiarizes students with the logic programming paradigm by showing its many useful features such as declarative interpretation of logic programs.
<b>Syllabus</b>	<p>Introduction to logic  Introducing Declarative programming and PROLOG  Compound objects and functors.  Unification  Recursion: tail and non-tail  Backtracking, fail and cut.  List processing  Database programming.  Meta-logic  Visual prolog [optional]  Advanced issues [optional]</p>

<b>Course code</b>	CS 5004
<b>Course name</b>	Compiler construction بناء المترجمات
<b>Compulsory/Elective</b>	Elective
<b>Syllabus</b>	<p>Introduction to programming language concepts  Introduction to compiler construction  Overview on Phases of compilation.  Lexical Analysis  Syntax Analysis  Semantic Analysis  Intermediate Code Generation  Run-Time Environments  Code Optimization and Code Generation</p>

<b>Course code</b>	CS 5006
<b>Course name</b>	Operating systems -2 <span style="float: right;">نظم التشغيل- 2</span>
<b>Compulsory/Elective</b>	Elective
<b>Description</b>	This course will provide an introduction to operating system design and implementation. The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years, and then cover the major components of most operating systems. This discussion will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system..
<b>Syllabus</b>	Introduction Processes and Threads Deadlocks Memory Management Input/Output File Systems Security and protection

<b>Course code</b>	CS 5007
<b>Course name</b>	Computer Arabization <span style="float: right;">تعريب الحاسبات</span>
<b>Compulsory/Elective</b>	Elective
<b>Description</b>	The course familiarizes students with different theories and techniques of Arabic language processing in order to arabize the computer
<b>Syllabus</b>	Spoken Language Input Written Language Input Language Analysis and Understanding Language Generation Spoken Output Technologies Discourse and Dialogue Document Processing Multi-linguality and translation Multimodality

<b>Course code</b>	CS 5009
<b>Course name</b>	Human Computer Interface <span style="float: right;">إتصال الإنسان بالحاسب</span>
<b>Compulsory/Elective</b>	Elective
<b>Description</b>	The course familiarizes students with different concepts and theories concerning Human Computer Interface.
<b>Syllabus</b>	Introduction Principles of models & guidelines (06 Hrs) Design Process Documentation and Social Issues Miscellaneous Case studies, web. embedded, information visualization, Interactive devices, social acceptability: organizational change

<b>Course code</b>	CS 5010
<b>Course name</b>	Artificial neural networks (ANN) الشبكات العصبية
<b>Compulsory/Elective</b>	Elective
<b>Description</b>	The course familiarizes students with different concepts and theories of Artificial neural networks.
<b>Syllabus</b>	What are Artificial neural networks? Supervised Learning Unsupervised Learning

<b>Course code</b>	1112 رياض
<b>Course name</b>	Discrete Computational Structures
<b>Core/Elective</b>	Core
<b>Credits</b>	Theory: 2      Project: 1      Lab: 2      TOT: 3
<b>Description</b>	To study different models for computing devices (the automata), their limitations and relationships to formal languages, and some applications of these computational models.
<b>Syllabus</b>	Introduction Regular Expressions Finite Automata Transition Graphs Nondeterministic Finite Automata Regular and Non-Regular Languages Finite Automata with Output Context-Free Grammars & Grammatical Format Pushdown Automata & CFG $\equiv$ PDA Turing Machines

## 2- دبلوم نظم المعلومات

<b>Course code</b>	CS 5111
<b>Course name</b>	Computer programming <span style="float: right;">برمجة الحاسبات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with programming languages, focusing on a particular modern computer programming language.
<b>Syllabus</b>	Introduction Control Statements Methods Arrays Object-Oriented Programming Selected topics [optional]

<b>Course Code</b>	IT 5112
<b>Course Name</b>	Introduction to Information Technology <span style="float: right;">مقدمة في تكنولوجيا المعلومات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course aims to provide the students with the introductory theory required to understand the components of computer systems, the operations of the systems and to expose students to some popular business application software. A major component of the course is the practical application of the knowledge gained from the theoretical content.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Operating Systems (Computer Classifications, Overview of Applications, Mail, News, Editors, RMIT News, FTP, Telnet.)</li> <li>• Single User Operating Systems, Multi User Operating Systems.</li> <li>• The Internet, Netiquette, Ethics.</li> <li>• The Programming Process, Programming languages, Collaborative Work.</li> <li>• The Central Processor, Executing Program Instructions.</li> <li>• Spreadsheet Introduction. Spreadsheets and Graphics.</li> <li>• Project Management Introduction. Managing a project.</li> <li>• Report Writing, Technical Reports, Document Enhancement.</li> <li>• Input and Output devices, Storage devices.</li> <li>• Creating a Home Page, Introduction to HTML, Writing a resume.</li> <li>• Systems Development Introduction, Systems Development Life Cycle.</li> </ul>



<b>Course Code</b>	MATH 5113
<b>Course Name</b>	Applied Statistics إحصاء تطبيقي
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course introduces the logic and procedures for statistical estimation, hypothesis testing, and model fitting in a variety of settings.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Probability Distributions: probability concepts, random variables, mean, variance, and standard deviation, normal distribution, standard normal, standardizing normal distributions, distribution of sample mean</li> <li>• Estimation: estimates of center and spread, coefficient of variation, standard error, estimation using computer programs</li> <li>• One-Sample Tests: hypothesis testing logic, Z and t tests on a single mean, t distribution, one-sided and two-sided tests, type I &amp; type II errors, power, sample size effects, p-values, one-sample tests using computer programs</li> <li>• Two-Sample Tests: pooled and approximate t tests for comparing two means, testing for equality of variances, inferring causality, two-sample tests using computer programs</li> <li>• Analysis of Variance: experimental framework and hypotheses, graphical representation, partitions of sums of squares and degrees of freedom, F distribution, coefficient of determination, multiple range procedures, analysis of variance using computer programs</li> <li>• Correlation: categorical data, chi-square test for association, chi-square distribution, Pearson's correlation, scale invariance, outliers, causality, chi-square test and correlation using computer programs</li> <li>• Simple Linear Regression: statistical model, graphical representation, least squares, estimation, residual plot, tests on intercept and slope, analysis of variance approach, R-square and adjusted R-square, outlier and influence detection, simple linear regression using computer programs</li> <li>• Multiple Linear Regression: general linear model, least squares estimation, testing the full model, multi-collinearity, collinearity diagnostics, partial tests, model evaluation criteria, stepwise regression, routines, cross validation, multiple linear regression using computer programs</li> </ul>

<b>Course Code</b>	IS 5114
<b>Course Name</b>	Information Economics إقتصاديات المعلومات
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	An introduction to economic reasoning as applied to information goods and services, with an emphasis on the distinctive nature of those goods and services. The course will cover basic economic approaches and analysis, consider the nature of information as an economic good, and the resulting implications for business operations, policy, and economics.
<b>Course Syllabus</b>	<p>Introduction to Course and Economics  Information as an Economic Good and Libraries as Firms  Analysis from an economic perspective  Internet and Issues  The Future of Information Economics &amp; Commerce</p>

<b>Course Code</b>	CS 5121
<b>Course Name</b>	Data Structures هياكل البيانات
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course introduces the fundamental concepts of data structures and the algorithms that proceed from them, the file system fundamentals, and developing skills in the design and implementation of complex software systems.
<b>Course Syllabus</b>	<p>Secondary Storage Devices Stacks, Queues, Linked Lists, Double-Ended Queues .</p> <p>Sequences (Ranked Sequences, Positional Sequences, General Sequences) .</p> <p>Trees (Binary Trees, Data Structures for Representing Trees) .</p> <p>Priority Queues (Priority Queue as a Sequence, Heaps).</p> <p>Dictionaries (Binary Search Trees, AVL Trees, Hash Tables).</p> <p>Sets, Sorting, Selection (Sets, Merge Sort, Quick Sort, Radix Sort Complexity of Sorting, Selection).</p> <p>Graphs (Data Structures for Graphs, Graph Traversal, Directed Graphs).</p> <p>Strings (Brute-Force String Pattern Matching, Regular Expression Pattern Matching, Tries).</p> <p>Record Storage and File Organizations (ordered and unordered files).</p> <p>Hashing and extendible hashing.</p> <p>Index structures for files (B-Trees, B+-Trees).</p>

<b>Course Code</b>	IS 5122
<b>Course Name</b>	Information Storage and Retrieval تخزين و استرجاع المعلومات
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Consideration of the basic principles and tools for analysis and retrieval of information in various information systems (both textual and database systems).
<b>Course Syllabus</b>	<p>Principles and Tools for Information Analysis and Storage</p> <ol style="list-style-type: none"> <li>1. Acquisition and analysis</li> <li>2. Structures and tools for organization of information for storage <ol style="list-style-type: none"> <li>a. Data representation, surrogation, and structures</li> <li>b. Indexing languages--natural language, controlling vocabularies, codes and coordination (subject analysis and terminology control)</li> <li>c. Coding and recording of information</li> <li>d. File structures (overview)</li> <li>e. Devices for association--semantic, syntactic, algorithmic</li> </ol> </li> </ol> <p>Retrieval Concepts</p> <ol style="list-style-type: none"> <li>1. Strategies for information seeking from structures files</li> </ol>

	<ul style="list-style-type: none"> <li>a. Query formulation</li> <li>b. Patterns of secondary/tertiary sources</li> <li>c. Classical strategies</li> <li>d. Stopping</li> <li>e. File performance criteria--precision/recall</li> </ul> <ul style="list-style-type: none"> <li>2. Strategies for information seeking for non-structured problem solving <ul style="list-style-type: none"> <li>a. Process</li> <li>b. Heuristic aids in structured files</li> <li>c. Focus on environment</li> </ul> </li> </ul> <p>Types of retrieval Systems</p> <ul style="list-style-type: none"> <li>1. Bibliographic retrieval systems</li> <li>2. Database management systems</li> <li>3. Statistical retrieval systems</li> </ul>
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<b>Course Code</b>	CS 5123
<b>Course Name</b>	Operating Systems <span style="float: right;">نظم التشغيل</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course provides the student with an understanding of the basic components of a general-purpose operating system.
<b>Course Syllabus</b>	<p>Overview: Role and purpose of operating systems; history of operating system development; functionality of a typical operating system; design issues.</p> <p>Basic principles: Structuring methods; abstractions, processes, and resources; design of application programming interfaces (AIS); device organization; interrupts; user/system state transitions.</p> <p>Concurrency: The idea of concurrent execution; states and state diagrams; implementation structures; dispatching and context switching; interrupt handling in a concurrent environment.</p> <p>Mutual exclusion: Definition of the “mutual exclusion” problem; deadlock detection and prevention; solution strategies; models and mechanisms (semaphores, monitors, condition variables, rendezvous); producer-consumer problems; synchronization; multiprocessor issues.</p> <p>Scheduling: Preemptive and nonpreemptive scheduling; scheduling policies; processes and threads; real-time issues.</p> <p>Memory management: Review of physical memory and memory management hardware; overlays, swapping, and partitions; paging and segmentation; page placement and replacement policies; working sets and thrashing; caching.</p> <p>Device management: Characteristics of serial and parallel devices; abstracting device differences; buffering strategies; direct memory access; recovery from failures.</p> <p>File systems: Fundamental concepts; content and structure of directories; file system techniques; memory-mapped files; special-purpose file systems; naming, searching, and access; backup strategies.</p> <p>Security and protection: Overview of system security; policy/mechanism separation; security methods and devices; protection, access, and authentication; models of protection; memory protection; encryption; recovery management.</p>

<b>Course Code</b>	IS 5124
<b>Course Name</b>	Geographic Information Systems نظم المعلومات الجغرافية
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Design, implementation and use of automated procedures for storage, analysis and display of spatial information.
<b>Course Syllabus</b>	<p>Measuring Systems.  Location: coordinate systems.  Attributes: data types.  Topology: Basic geometric elements.  Raster Data Models.  Vector Data Models.  TIN.  Aspatial Data Models: Relational Tables.  DBMS and its use in GIS.  Data Input (spatial and thematic).  Coordinate Transformation.  Data Editing (spatial and thematic).  Metadata.  Spatial Queries.  Digital terrain analysis.  Statistical operations.  Spatial Overlay.</p>

<b>Course Code</b>	IT 5211
<b>Course Name</b>	Computer Graphics-1 الرسم بالحاسب - 1
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Offers an introduction to computer graphics, which has become an increasingly important area within computer science. Computer graphics, particularly in association with the multimedia aspects of the World-Wide Web, have opened up exciting new possibilities for the design of human-computer interfaces.
<b>Course Syllabus</b>	<p>Graphic systems: Raster and vector graphics systems; video display devices; physical and logical input devices; issues facing the developer of graphical systems.</p> <p>Fundamental techniques in graphics: Hierarchy of graphics software; using a graphics API; simple color models; homogeneous coordinates; affine transformations; viewing transformation; clipping.</p> <p>Graphical algorithms: Line generation algorithms; structure and use of fonts; parametric polynomial curves and surfaces; polygonal representation of 3D objects; introduction to ray tracing; image synthesis, sampling techniques, and anti-aliasing.</p> <p>Principles of human-computer interaction: Human-centered software development and evaluation.</p> <p>Graphical user-interface design: Choosing interaction styles and interaction techniques; HCI aspects of interface design; dynamics of color; structuring a view for effective understanding.</p> <p>Graphical user-interface programming: Graphical widgets; event management and user interaction; GUI builders and programming environments.</p> <p>Computer animation: Key-frame animation; camera animation; scripting</p>

	<p>system; animation of articulated structures; motion capture; procedural animation; deformation.</p> <p>Multimedia techniques: Sound, video, and graphics; design of multimedia systems; tools for multimedia development.</p>
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<b>Course Code</b>	IS 5212
<b>Course Name</b>	Database Systems نظم قواعد البيانات
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course is designed to introduce the foundations of database systems, focusing on basics such as the relational algebra and data model, query optimization, query processing, and transactions.
<b>Course Syllabus</b>	<p>Information models and systems: History and motivation for information systems; information storage and retrieval; information management applications; information capture and representation.</p> <p>Database systems: History and motivation for database systems; components of database systems; DBMS functions; database architecture and data independence.</p> <p>Data modeling: Data modeling; conceptual models; object-oriented model; relational data model.</p> <p>Relational databases: Mapping conceptual schema to a relational schema; entity and referential integrity; relational algebra and relational calculus.</p> <p>Database query languages: Overview of database languages; SQL; query optimization; 4th-generation environments; embedding non-procedural queries in a procedural language; introduction to Object Query Language.</p> <p>Relational database design: Database design; functional dependency; normal forms; multivalued dependency; join dependency; representation theory.</p> <p>Transaction processing: Transactions; failure and recovery; concurrency control.</p> <p>Distributed databases: Distributed data storage; distributed query processing; distributed transaction model; concurrency control; homogeneous and heterogeneous solutions; client-server.</p> <p>Physical database design: Storage and file structure; indexed files; hashed files; signature files; b-trees; files with dense index; files with variable length records; database efficiency and tuning.</p>

<b>Course Code</b>	IS 5213
<b>Course Name</b>	Systems Analysis and Design تحليل وتصميم نظم
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Students will learn to analyze a business process and document it using function decomposition diagrams, data flow diagrams (DFD), and other modeling techniques. The students will also learn to design system inputs/outputs, and user interface.
<b>Course Syllabus</b>	<p>Course overview; Review of IS concepts; Role of Modeling in Systems Analysis.</p> <p>Life cycle phases including systems selection and planning, analysis, logical design, physical design, implementation and operation, maintenance</p> <p>Techniques for requirements determination, collection, and organization (questionnaires, interviewing, document analysis, observation); joint application design.</p>

	<p>Team organization and communication; interviewing, presentation design, and delivery; group dynamics; and leadership.</p> <p>Project feasibility assessment and risk analysis.</p> <p>Design reviews and structured walkthroughs.</p> <p>Object-oriented analysis and design.</p> <p>Unified Modeling Language (UML).</p> <p>Data organization and design.</p> <p>Software and system quality metrics.</p> <p>Application categories.</p> <p>Software package evaluation and acquisition.</p> <p>Design &amp; Implementation concepts.</p> <p>Conceptual, logical, and physical data models, and modeling tools.</p> <p>Structured and object design approaches; models for databases: relational and object oriented.</p> <p>Design tools; data dictionaries, repositories, warehousing, and data mining.</p> <p>Database implementation including user interface and reports.</p> <p>Multi-tier planning and implementation.</p> <p>Data conversion and post implementation review.</p> <p>Writing technical reports.</p> <p>Project Management &amp; Team Development.</p>
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<b>Course Code</b>	CS 5214
<b>Course Name</b>	Artificial Intelligence الذكاء الاصطناعي
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Introduces students to the fundamental concepts and techniques of artificial intelligence
<b>Course Syllabus</b>	<p>Fundamental issues in intelligent systems: History of artificial intelligence; philosophical questions; fundamental definitions; philosophical questions; modeling the world; the role of heuristics.</p> <p>Search and constraint satisfaction: Problem spaces; brute-force search; best-first search; two-player games; constraint satisfaction.</p> <p>Knowledge representation and reasoning: Review of propositional and predicate logic; resolution and theorem proving; nonmonotonic inference; probabilistic reasoning; Bayes theorem.</p> <p>Advanced search: Genetic algorithms; simulated annealing; local search.</p> <p>Advanced knowledge representation and reasoning: Structured representation; nonmonotonic reasoning; reasoning on action and change; temporal and spatial reasoning; uncertainty; knowledge representation for diagnosis, qualitative representation.</p> <p>Agents: Definition of agents; successful applications and state-of-the-art agent-based systems; software agents, personal assistants, and information access; multi-agent systems.</p> <p>Machine learning and neural networks: Definition and examples of machine learning; supervised learning; unsupervised learning; reinforcement learning; introduction to neural networks.</p> <p>AI planning systems: Definition and examples of planning systems; planning as search; operator-based planning; propositional planning.</p>

<b>Course Code</b>	IS 5216
<b>Course Name</b>	Project المشروع
<b>Compulsory/Elective</b>	Compulsory

<b>Course Syllabus</b>	The project is intended to give the student a chance to put to practical use all the knowledge acquired in his study since he started . It should end with a software package designed to fulfill a predefined task. Throughout the project, the student is encouraged to practice the good procedures needed in all phases of package development, analysis, design, implementation, testing, and deployment. The project may or may not include hardware design and implementation.
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<b>Course Code</b>	IS 5221
<b>Course Name</b>	Multimedia الوسائط المتعددة
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	The creation of interactive multimedia products for cross-platform delivery.
<b>Course Syllabus</b>	<p>Introduction to Multimedia Authoring and Production.  The Multimedia Development Process.  Introduction to Multimedia Scripting.  Types of Lingo Scripts / Behaviors / Handlers.  The Sampling Process: Understanding Audio / Video.  Using Lists and Casts.  Understanding Programming Structures.  Human Computer Interface Design.  Graphics, Audio, and Movie File Formats.  Databases, Lists, and Shockwave.  Storage and Delivery Technologies.  Global Development Issues.  Legal Issues, Copyrights, Taxes.</p>

<b>Course Code</b>	IT 5222
<b>Course Name</b>	Computer Networks شبكات الحاسب
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course introduces principles and current trends in computer networks. The ISO Reference Model will be used as the framework with the course progressing through the physical, data link, network, transport, session, and presentation layers.
<b>Course Syllabus</b>	<p>Physical and link layer communication: media, signals, and bits; time division and frequency division multiplexing; encoding; modulation; delay, bandwidth, throughput, and noise; error correction techniques; CSMA/CD; CSMA/CA; Ethernet addressing and wiring; hubs.  Packet communication: Local Area Network and Wide Area Network technologies; token passing rings; FDDI; wireless networks; network interconnection with repeaters, bridges, and switches; DSU/CSU; xDSL and cable modems; store-and-forward; next-hop forwarding.  Internetworking: router-based architecture; IP addressing; address binding with ARP; datagram encapsulation and fragmentation; link-state and distance-vector routing; Dijkstra's algorithm; network properties: ownership and service paradigm; UDP and TCP; TCP segment format; adaptive retransmission; protocol ports; ICMP and error handling.  Network applications: client/server concept; port demultiplexing; socket API; server concurrency; DNS; TELNET; Web technologies including HTML, HTTP, CGI, Java; RPC and middleware; network management.</p>

<b>Course Code</b>	IS 5223
<b>Course Name</b>	Information Centers Management إدارة مراكز المعلومات
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course discusses management issues and problems of planning, developing, installing, operating, and maintaining information systems in organizations.
<b>Course Syllabus</b>	strategic planning for information systems, developing and maintaining IT infrastructure, data resource management, information systems project management, emerging organizational structures for information systems management, security and control issues, maintenance, and recovery of information systems resource Strategic planning for information systems Developing and maintaining IT infrastructure Data resource management Information systems project management Emerging organizational structures for information systems management Security and control issues Maintenance of information systems resources Recovery of information systems resources

<b>Course Code</b>	IS 5226
<b>Course Name</b>	Project
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This is a continuation to the project of the first semester.

<b>Course Code</b>	IS 5001
<b>Course Name</b>	Information Sources مصادر المعلومات
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	This course focuses on understanding users' information needs and seeking behaviors and on meeting those needs through provision of information. The course introduces the philosophy, principles, and practice of reference services (broadly defined) and provides practical experience in evaluating and using a variety of information sources.
<b>Course Syllabus</b>	Reference and information access professionals Reference & information access services; Current issues and trends; Information-seeking and user behavior Question analysis, question negotiation, and the reference interview Bibliographic control, organization of info., & search strategies Selection and evaluation of reference materials Bibliographic sources and search strategies Indexes and abstracts Encyclopedias and Biographical sources Ready Reference, Geographical sources, and Dictionaries Government, Business, and Statistical sources



	Information ethics; Evaluation of reference services; Reference services for specific populations Information literacy and bibliographic instruction Virtual reference services and evaluation
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<b>Course Code</b>	CS 5002
<b>Course Name</b>	Technical Information Processing <span style="float: right;">المعالجة الفنية للمعلومات</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	Information processing extends the Signal processing terrain to such areas as pattern classification, language processing, bio-informatics, error-correcting coding and database searching
<b>Course Syllabus</b>	Probability theory review, Bayesian Machine Learning, Working with Gaussians Density estimation, Linear Regression, Generative classification, Discriminative class Gaussian mixture models, EM algorithm Factor Analysis and PCA, Independent Component Analysis Hidden Markov Models, Kalman Filters Model selection: The Bayesian Information Criterion, Descriptive Complexity Descriptive complexity: Probabilistic complexity up to The meaning of model information Bayesian model estimation Model posterior for Context trees

<b>Course Code</b>	IS 5003
<b>Course Name</b>	Information Services <span style="float: right;">خدمات المعلومات</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	Concepts, processes, and skills related to parts of the life cycle of knowledge involving creation, production, distribution, selection, collection, and services to facilitate access.
<b>Course Syllabus</b>	Characteristics of recorded knowledge Organizations and services devoted to managing access to recorded knowledge Principles associated with development of recorded knowledge and collections Determination and analysis of information needs Searching for, evaluation, and presentation of appropriate information results Modalities for delivery of services Current and future techniques of information services

<b>Course Code</b>	IS 5004
<b>Course Name</b>	Database Design <span style="float: right;">تصميم قواعد البيانات</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	This course covers the steps to effectively plan and design functional, efficient databases. Individuals who already use relational databases, and have a need to design or modify the design of tables to be used in a relational database management system
<b>Course Syllabus</b>	<p>Databases Concepts and Architectures: a brief description of hierarchical and network database models.</p> <p>The Relational Data Model: domains, tuples, attributes and relations, database schemas, relational algebra.</p> <p>Information Retrieval and Query Languages: further SQL, relational calculus, QUEL, QBE.</p> <p>Relational Database Systems Development: multi-valued and join dependencies, fourth and fifth normal form.</p> <p>Overview of Database Design Process: requirements collection, conceptual schema design, data model mapping, physical database design.</p> <p>Database System Implementation Techniques: query processing and optimisation; transaction, recovery and concurrency control; security and integrity constraints</p>

<b>Course Code</b>	IS 5005
<b>Course Name</b>	Data Processing in Local Networks <span style="float: right;">معالجة البيانات في بيئة الشبكات المحلية</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	This course explores the processing of data in networking systems. A study of different structures of information processing utilizing communications networks, including the Internet and intranets. Technology implications of computer hardware, software, and telecommunications are discussed as they relate to the design, development, and implementation of distributed data processing and client/server systems. Discussions will include local and wide area networks
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>○ The Basics</li> <li>○ Machine and Human Communications</li> <li>○ Sending User Traffic on the Link</li> <li>○ The Modem and the Telephone Network</li> <li>○ Digital Networks</li> <li>○ Bit Rates and Broadband Systems</li> <li>○ Voice and Data: Why they are different</li> <li>○ Multiplexing</li> <li>○ Network Identifiers: Names</li> <li>○ Connecting to the Data Network</li> <li>○ Routing Traffic Through the Network</li> <li>○ Backup and Route Discovery: Creating the Road Map</li> <li>○ The Internet and Internet Service Providers</li> <li>○ Network Identifiers: Domain Names</li> </ul>

<b>Course Code</b>	IS 5006
<b>Course Name</b>	Office Automation Systems نظم ميكنة المكاتب
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	This course is applicable to the area of current and future developments of office technology, processes and its management, as well as the social, organizational and economic implication of office automation in today's office.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>Management information systems</li> <li>Decision support systems</li> <li>Distributed data processing</li> <li>Word processing</li> <li>Electronic mail</li> <li>Electronic filing systems</li> <li>Telecommunications</li> <li>Ergonomics</li> <li>Human relations</li> <li>Time management</li> <li>Records management</li> <li>Analysis of office automation needs</li> <li>Design and acquisition of appropriate systems.</li> </ul>

<b>Course Code</b>	IS 5007
<b>Course Name</b>	Decision Support Systems نظم دعم القرار
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	This course addresses the trend in decision making towards use of computer based decision support systems that increase the effectiveness of the decisions. A decision support system uses analytical models of management science, information from MIS and human judgment to come up with recommendations
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>Management Support Systems: An Overview</li> <li>Modeling and simulation</li> <li>Decision-making in organizations</li> <li>Enterprise Decision Support Systems</li> <li>Nature of decision-support systems</li> <li>Decision trees and value trees</li> <li>Representation and storage of information and knowledge</li> <li>Overview of intelligent decision support systems:</li> <li>Rule-based reasoning</li> <li>Case-based reasoning</li> <li>Expert system shells</li> <li>Dealing with uncertainty</li> <li>Neural networks</li> </ul>

<b>Course Code</b>	IT 5008
<b>Course Name</b>	Information Networks شبكات المعلومات
<b>Core/Elective</b>	Elective
<b>Course Description</b>	Information networks such as the Internet, World Wide Web, or social networks can be characterized by heterogeneity and independence of their building blocks (nodes) and the complex underlying link structure between them. This course tries to survey the mathematical results developed in the last few years on algorithms for analyzing such networks, and models that capture their basic properties.
<b>Course Syllabus</b>	<p>Random graph models:</p> <p>Erdos-Renyi random graphs: cluster growth, formation of the giant connected component, diameter and distance distribution</p> <p>Scale-free graphs: random graphs with a fixed degree distribution, preferential attachment model and Polya urns</p> <p>Algorithmic aspects</p> <p>Expansion, eigenvalue gap and their algorithmic implications; spectrum of random and scale-free graphs; random walks and propagation of viruses; spectral clustering and applications in data mining.</p> <p>Decentralized search and small-world properties. Small-world effects in online datasets; decentralized search in structured and unstructured networks.</p> <p>Case studies</p> <p>WWW: graph structure in the WWW; searching the web; PageRank, HITS etc.</p> <p>Internet: the Internet at the router and autonomous systems level.</p> <p>Social Networks: online social networks; contagion and cascading behavior in a social network</p>

<b>Course Code</b>	CS 5009
<b>Course Name</b>	Expert Systems النظم الخبيرة
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing.
<b>Course Syllabus</b>	<p>Introduction ( overview of branches of AI ).</p> <p>Knowledge Representation (Semantic Nets, Frames, Logic).</p> <p>Reasoning and Inference (Predicate Logic, Inference Methods, Resolution).</p> <p>Reasoning with Uncertainty (Probability, Bayesian Decision Making).</p> <p>Expert System Design.</p> <p>Architecture of expert systems.</p> <p>Expert system tools.</p> <p>CLIPS Overview (Concepts, Notation, Usage).</p> <p>Pattern Matching (Variables, Functions, Expressions, Constraints).</p> <p>Expert System Implementation (Saliency, Rete Algorithm).</p> <p>Expert System Examples.</p>

### 3- دبلوم تكنولوجيا المعلومات

<b>Course code</b>	CS 5111
<b>Course name</b>	Computer programming <span style="float: right;">برمجة الحاسبات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with programming languages, focusing on a particular modern computer programming language.
<b>Syllabus</b>	Introduction Control Statements Methods Arrays Object-Oriented Programming Selected topics [optional]

<b>Course code</b>	MATH 5112
<b>Course name</b>	Discrete Computational Structures <span style="float: right;">تراكيب حسابية غير متصلة</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	To study different models for computing devices (the automata), their limitations and relationships to formal languages, and some applications of these computational models.
<b>Syllabus</b>	Introduction Regular Expressions Finite Automata Transition Graphs Nondeterministic Finite Automata Regular and Non-Regular Languages Finite Automata with Output Context-Free Grammars & Grammatical Format Pushdown Automata & CFG $\equiv$ PDA Turing Machines

<b>Course code</b>	MATH 5113
<b>Course name</b>	Statistical methods <span style="float: right;">طرق إحصائية</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with statistics showing the power of application in life and computer science.
<b>Syllabus</b>	Introduction to Statistics Data grouping Measures of Relative Standing Estimation Hypothesis Tests Regression Selected topics [optional]

<b>Course code</b>	IS 5114
<b>Course name</b>	Introduction to Information systems <span style="float: right;">مقدمة في علم النظم</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The goal of this course is to present a core of IS principles with which every information science student should be familiar and to study real cases that are associated with IS applications in order to understand the issues in IS disciplines. It will also give learning opportunity to realize the changing role of the IS professional and show the value of the discipline as an attractive field of specialization.
<b>Syllabus</b>	Information Systems in Organizations Hardware: Input, Processing, and Output Devices Software: Systems and Application Software Organizing Data and Information Telecommunications and Networks The Internet, Intranets, and Extranets Electronic Commerce Transaction Processing and Enterprise Resource Planning Systems Information and Decision Support Systems Specialized Business Information Systems: Artificial Intelligence, Expert Systems, Virtual Reality, and Other Specialized Systems Systems Investigation and Analysis Systems Design, Implementation, Maintenance, and Review Security, Privacy, and Ethical Issues in Information Systems and the Internet

<b>Course code</b>	MATH 5115
<b>Course name</b>	Mathematics (3) <span style="float: right;">رياضيات (3)</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with various set of topics which form as a basis of many algorithms and problem solving in mathematics and computer science.
<b>Syllabus</b>	Logic Set theory Number Theory Mathematical Induction Counting Functions Relations Selected topics [optional] Graph Theory

<b>Course Code</b>	CS 5121
<b>Course Name</b>	Data Structures <span style="float: right;">هياكل البيانات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course introduces the fundamental concepts of data structures and the algorithms that proceed from them, the file system fundamentals, and

	developing skills in the design and implementation of complex software systems.
<b>Course Syllabus</b>	<p>Secondary Storage Devices Stacks, Queues, Linked Lists, Double-Ended Queues .</p> <p>Sequences (Ranked Sequences, Positional Sequences, General Sequences) .</p> <p>Trees (Binary Trees, Data Structures for Representing Trees) .</p> <p>Priority Queues (Priority Queue as a Sequence, Heaps).</p> <p>Dictionaries (Binary Search Trees, AVL Trees, Hash Tables).</p> <p>Sets, Sorting, Selection (Sets, Merge Sort, Quick Sort, Radix Sort Complexity of Sorting, Selection).</p> <p>Graphs (Data Structures for Graphs, Graph Traversal, Directed Graphs).</p> <p>Strings (Brute-Force String Pattern Matching, Regular Expression Pattern Matching, Tries).</p> <p>Record Storage and File Organizations (ordered and unordered files).</p> <p>Hashing and extendible hashing.</p> <p>Index structures for files (B-Trees, B+-Trees).</p>

<b>Course code</b>	CS 5122
<b>Course name</b>	File Organization and Processing تنظيم الملفات ومعالجتها
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	<p>This class will provide the skills to: Enable the analysis of the trade-offs of the data-handling needs of a particular problem situation. Also to select the appropriate data structure or file organization.</p> <p>Students will understand what in general is going on in the computer both in the active main memory data structure part, as well as in the auxiliary data part of the computer.</p>
<b>Syllabus</b>	<p>Introduction to File Structures</p> <p>Fundamental File Processing Operations</p> <p>Secondary Storage and System Software</p> <p>Fundamental File Structure Concepts</p> <p>Managing Files and Records</p> <p>Indexing</p> <p>Sequential Processing and the Sorting of Large Files</p> <p>Multilevel Indexing and B-Trees</p> <p>Indexed Sequential File Access and Prefix B+ Trees</p> <p>Hashing</p> <p>Extendible Hashing</p> <p>SELECTIVELY,</p> <p>Case study reading and writing in files using C++, VB, and/or Pascal</p>

<b>Course code</b>	CS 5123		
<b>Course name</b>	Logic Design <span style="float: right;">تصميم منطقي</span>		
<b>Compulsory/Elective</b>	Compulsory		
<b>Credits</b>	Theory: 2	Project: 1	Lab: 2   TOT: 3
<b>Description</b>	The course introduces the fundamental concepts of digital systems . As well as Number systems, Boolean and switching algebra. Combinational logic circuits (analysis and design) , vs. Sequential logic circuits (analysis and design).		
<b>Syllabus</b>	Binary Systems: Boolean Algebra and Logic Gates: Gate Level Minimization Combinational Logic Design: Synchronous Sequential Logic: Registers and Counters		

<b>Course code</b>	MATH 5124		
<b>Course name</b>	Probability and Statistical distributions <span style="float: right;">الإحتمالات والتوزيعات الإحصائية</span>		
<b>Compulsory/Elective</b>	Compulsory		
<b>Description</b>	The course familiarizes students with probability showing the power of application in life and computer science.		
<b>Syllabus</b>	Introduction to Probability Combinatorics Conditional Probability Random Variables Expected Value and Variance Discrete Probability Distributions Continuous Probability Densities Generating Functions Selected topics [optional]		

<b>Course code</b>	IT 5125		
<b>Course name</b>	Advanced Digital Signal Processing <span style="float: right;">معالجة إشارات رقمية متقدم</span>		
<b>Compulsory/Elective</b>	Compulsory		
<b>Description</b>	This course will cover important concepts of digital signal processing. The fundamentals of discrete-time statistical signal processing are presented in this course. Topics include optimal linear filter theory, classical and modern spectrum analysis, adaptive filtering, and the singular value decomposition and its application to least squares problems..		
<b>Syllabus</b>	<ul style="list-style-type: none"> <li>○ Classical spectral estimation</li> <li>○ Periodograms</li> <li>○ -Multirate signal processing</li> <li>○ Adaptive filtering</li> <li>○ Adaptive noise canceller</li> <li>○ Parametric methods</li> <li>○ Cepstral Analysis</li> <li>○ Bispectral Analysis</li> </ul>		



<b>Course code</b>	CS 5211
<b>Course name</b>	Software Engineering-1 هندسة البرمجيات-1
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with classical and modern concepts of Software engineering.
<b>Syllabus</b>	Introduction to Software engineering Software models Requirements specification Software analysis Development Object-oriented design and UML Software testing

<b>Course code</b>	CS 5212
<b>Course name</b>	Operating systems-1 نظم التشغيل-1
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course familiarizes students with the concept of operating system. The course studies both historical and implementation issues.
<b>Syllabus</b>	Introducing operating system Operating systems structure Process management CPU scheduling Memory management

<b>Course code</b>	CS 5213
<b>Course name</b>	Computer organization تنظيم الحاسبات
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	This course provides a programmer's view of how computer systems execute programs, store information, and communicate. It enables students to become more effective programmers Topics covered include: machine-level code and its generation by optimizing compilers, performance evaluation and optimization, computer arithmetic, memory organization and management.
<b>Syllabus</b>	Course Overview - Tour of Computer Systems. Representing & Manipulating Information Machine-Level Representation of Programs Memory Hierarchy. Virtual Memory. (Chapter 10) Measuring Program Execution Time. Exceptions Processes. Concurrent Programming. System-Level I/O. Network Programming

<b>Course code</b>	IT 5214
<b>Course name</b>	Computer networks-1 <span style="float: right;">شبكات الحاسب -1</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	The course introduces the networking to the students.
<b>Syllabus</b>	<p>Introduction : definition and topologies</p> <p>The OSI model</p> <p>The Link Layer</p> <p>Booting</p> <p>The Internet Protocol</p> <p>Routing and Dynamic Routing</p> <p>Name Services</p> <p>Spring Recess</p> <p>TCP vs. UDP</p> <p>Security [optional]</p> <p>Networked File Systems</p> <p>Applications [optional]</p> <p>Building Applications</p> <p>DNS [optional]</p> <p>Ether net [optional]</p>

<b>Course Code</b>	<b>IT5216</b>
<b>Course Name</b>	<b>Project</b> <span style="float: right;">المشروع</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Syllabus</b>	<p>The project is intended to give the student a chance to put to practical use all the knowledge acquired in his study since he started . It should end with a software package designed to fulfill a predefined task. Throughout the project, the student is encouraged to practice the good procedures needed in all phases of package development, analysis, design, implementation, testing, and deployment. The project may or may not include hardware design and implementation.</p>

<b>Course code</b>	IT 5221
<b>Course name</b>	Computer graphics-1 <span style="float: right;">الرسم بالحاسب-1</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Description</b>	Hardware and software components of graphics systems. Output and filled data primitives. 2D and 2D geometric transformations. Two dimensional viewing: viewing pipeline, clipping, and windowing. Three dimensional viewing: viewing pipeline, viewing parameters, projections, viewing transformations, clipping, visible surface detection. Introduction to illumination models and surface rendering.
<b>Syllabus</b>	<p>Introduction.</p> <p>Output primitives (DDA, Bresenham's, circle and generating algorithms).</p> <p>Introduction to the practical use of OpenGL.</p> <p>Filled area primitives</p> <p>2D and 3D geometric transformations.</p> <p>Two-dimensional viewing.</p> <p>Three-dimensional object representations</p> <p>Three-dimensional viewing</p> <p>Visible surface detection (back face, depth buffer, depth sorting)</p> <p>Illumination models, and surface rendering</p>

<b>Course Code</b>	IS 5222
<b>Course Name</b>	Multimedia الوسائط المتعددة
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	The creation of interactive multimedia products for cross-platform delivery.
<b>Course Syllabus</b>	<p>Introduction to Multimedia Authoring and Production.  The Multimedia Development Process.  Introduction to Multimedia Scripting.  Types of Lingo Scripts / Behaviors / Handlers.  The Sampling Process: Understanding Audio / Video.  Using Lists and Casts.  Understanding Programming Structures.  Human Computer Interface Design.  Graphics, Audio, and Movie File Formats.  Databases, Lists, and Shockwave.  Storage and Delivery Technologies.  Global Development Issues.  Legal Issues, Copyrights, Taxes.</p>

<b>Course Code</b>	IT 5226
<b>Course Name</b>	Project
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This is a continuation to the project of the first semester.

<b>Course code</b>	IT 5001
<b>Course name</b>	Pattern Recognition التعرف على الأنماط
<b>Compulsory/Elective</b>	Elective
<b>Description</b>	The objective of this course is to enable the students to understand the fundamentals of pattern recognition. The students should learn to choose an appropriate features and pattern classification algorithm for a pattern recognition problem, properly implement the algorithm using modern computing tools such as Matlab, OpenCV, C, C++
<b>Syllabus</b>	Various methods of pattern recognition, extraction methods, statistical classification, minmax procedures, maximum likelihood decisions, data structures for pattern recognition, case studies.

<b>Course Code</b>	IT 5002
<b>Course Name</b>	Character Recognition التعرف على الحروف
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	The course familiarizes students with classical and modern concepts of Pattern recognition principles, approaches, algorithms, theoretical foundations of classification, optical character, speech and face recognition. Statistical decision theory, adaptive classifiers, supervised and unsupervised learning techniques

<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>o Statistical methods</li> <li>o Discriminant functions</li> <li>o Clustering, and syntactic methods</li> <li>o Parallel and sequential recognition methods</li> <li>o Bayesian decision procedures</li> <li>o Perceptrons</li> <li>o Statistical and syntactic approaches</li> <li>o Recognition grammars</li> <li>o Feature extraction</li> <li>o Feature extraction</li> <li>o Feature selection</li> <li>o Optical character recognition</li> </ul>
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<b>Course Code</b>	IT 5003
<b>Course Name</b>	Speech recognition and Synthesis التعرف على الكلام وتوليدہ
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	This course is an introduction to speech signal processing. Topics include production & classification of speech sounds, pole-zero models, homomorphic signal processing, short-time Fourier transform analysis and synthesis, filter-bank analysis and synthesis, sinusoidal analysis and synthesis, pitch estimation, and speech coding. .
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>o Human hearing, acoustics, and phonetics</li> <li>o Finite state transducers</li> <li>o ASR toolkits</li> <li>o Dynamic time warping and acoustic modeling</li> <li>o HMMs, expectation-maximization, and search</li> <li>o Language modeling</li> <li>o Text analysis</li> <li>o Speech synthesis</li> <li>o Speech processing in context (systems)</li> </ul>

<b>Course Code</b>	IT 5004
<b>Course Name</b>	Image Processing and Computer Vision التعامل مع الصور والرؤية بالحاسب
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	The course develops knowledge of basic image processing algorithms and systems; increasing the student's ability to design a system, component or a process to meet specified image processing needs.
<b>Course Syllabus</b>	Digital Image Fundamentals: Storage, Perception, Image Models, and Sampling Image Transforms and Applications Image Filtering and Applications Image Reconstruction and Restoration Additional Image Processing Algorithms Image Segmentation and Feature Extraction Digital Video Fundamentals: Storage, Video Models, Video Processing

<b>Course Code</b>	IT 5005
<b>Course Name</b>	Virtual Reality <span style="float: right;">الواقع الافتراضي</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	This course introduces cutting-edge virtual reality technology currently available in academia and industry. It provides an introduction to the physical principles, technological challenges, possibilities and limitations for the creation of virtual environments. Projects emphasize the visualization and exploration of scientific data in virtual environments.
<b>Course Syllabus</b>	3D virtual world creation and net delivery technologies, 2) avatar, bot, agent and biote design, 3) psychological impact of avatars, interface affordances and world aesthetics on inhabiting virtual communities, 4) use of virtual worlds in learning, play, collaboration, science and the arts

<b>Course Code</b>	IT 5006
<b>Course Name</b>	Information Engineering <span style="float: right;">هندسة المعلومات</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	This course puts the study of information engineering in societal perspective, helping students appreciate the significance, value, practices and contributions of an information engineer to society..
<b>Course Syllabus</b>	The lectures will introduce the major topics of information engineering (e.g., information theory, transmission and networking) and discuss how they are related within the discipline. This course prepares students with the necessary information, communication, learning and creating skills for study and future career. It requires students to read articles on information technologies and applications, and do case studies on how technologies can benefit a particular sector of the society..

<b>Course Code</b>	IT 5007
<b>Course Name</b>	Integrated Services Digital Networks <span style="float: right;">الشبكات الرقمية للخدمات المتكاملة</span>
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	The course covers the basic principles of telecommunication, computer networking technologies, and managing a local area network (LAN) in a business environment. The course provides hands-on experience in LAN administration using widely adopted networking software in a computer laboratory.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>○ Introduction to telecommunications management</li> <li>○ The Telecommunications Act of 1996</li> <li>○ Telecommunications strategic planning</li> <li>○ Developing requirements and specifications</li> <li>○ Writing Requests for Proposals (RFP)</li> <li>○ Evaluating responses to RFP</li> <li>○ Managing Internet Services</li> <li>○ Wiring plans and equipment rooms</li> <li>○ Managing Local Area Networks and Internets</li> <li>○ Managing Wide Area Networks</li> <li>○ Managing convergence</li> <li>○ Contracting and outsourcing</li> </ul>

	<ul style="list-style-type: none"> <li>○ Optimizing data network bandwidth</li> <li>○ Network administration and support</li> <li>○ Cutover planning and management</li> <li>○ Enterprise and distributed networks</li> <li>○ Network maintenance and testing</li> <li>○ Network management systems</li> </ul>
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<b>Course Code</b>	IT 5008
<b>Course Name</b>	Information Networks شبكات المعلومات
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	This course covers recent research on the structure and analysis of such networks, and on models that abstract their basic properties.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>○ <b>Network structure</b> of Internet, World Wide Web, and social networks.</li> <li>○ <b>Modeling:</b> Erdős-Renyi graphs, power-law networks, small-world phenomenon.</li> <li>○ <b>Algorithmic aspects:</b> methods for link analysis, centralized and decentralized search, conductance, spectral gap and the effect of structure on performance.</li> <li>○ <b>Economic aspects:</b> incentive issues in network formation, routing games.</li> <li>○ <b>Security:</b> vulnerability and robustness to random failures and worst-case attacks, contact process and the spread of viruses.</li> </ul>

<b>Course Code</b>	IT 5011
<b>Course Name</b>	Design of Information Networks تخطيط و تصميم شبكات المعلومات
<b>Compulsory/Elective</b>	Elective
<b>Course Description</b>	Recent advances and new applications in the expanding field of telecommunications and computer networks are examined. Network technologies, architectures, protocols, and performance characteristics are described. Strategies, tools, and techniques for network planning, implementation, management, maintenance, and security are delineated. .
<b>Course Syllabus</b>	An Introduction to the Computer Communications Environment Telecommunications and computer networks fundamentals Emerging network paradigm Information transfer dynamics Modes of transmission and transmission media Communication techniques Response time and QoS (Quality of Service) guarantees Networking Essentials Types of networks General applications Network configurations and topologies Network features and performance Standards Internetworking goals and objectives Standards and specifications Standards organizations and forums OSI Reference Model Network Design Performance and design considerations Network requirements for multimedia deployment Traffic characteristics

	<p>User specifications and expectations  Connectivity, scalability, and reliability  Administration, maintenance, and expandability  Systems approach to network design  Steps in the design process  Outsourcing versus internal design  LANs, MANs, and WANs  Enterprise-wide networks  Client/server networks  Virtual Private Networks (VPNs)</p> <p>Cellular Networks  First, Second, and Third Generation Cellular Communications Solutions</p> <p>Wireless Networks  Wireless network fundamentals  IEEE 802.11b Wireless Ethernet LAN  Bluetooth Wireless Personal Area Networks (WPANs)  Design considerations  Trends in wireline and wireless network paradigms</p> <p>Wireline and Wireless Broadband Residential Access Networks  Cable Modem  DSL</p> <p>High-Capacity Broadband Networking Solutions  ATM  Gigabit Ethernet  SONET and SDH  WDM and DWDM</p> <p>Next-Generation Networks  Internet2</p>
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## مقررات الدبلوم المهني في تكنولوجيا المعلومات

### مقررات الفرقة الأولى

<b>Course Code</b>	CS 7111
<b>Course Name</b>	<b>Operating Systems</b> <span style="float: right;">نظم تشغيل</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Advanced issues in operating systems
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Overview of Operating system scheduling.</li> <li>• Distributed Synchronization and Timing</li> <li>• Distributed File System</li> <li>• Theory and implementation aspects of distributed operating systems. Distributed processes, distributed algorithms and distributed systems.</li> <li>• OS issues related to the Internet, intranets, pervasive computing, active networks, mobile systems and wireless networks.</li> <li>• Selected articles from leading journals and conference proceedings, and case studies.</li> <li>• Discussions, seminars and debates on research issues and operating system implementations.</li> </ul>

<b>Course Code</b>	IS 7112
<b>Course Name</b>	<b>Introduction to Information Systems</b> <span style="float: right;">مقدمة في نظم المعلومات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course provides an introduction to systems and development concepts, information technology, and application software. It explains how information is used in organizations and how IT enables improvement in quality, timeliness, and competitive advantage.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Systems and IT Concepts.</li> <li>• IS life cycle.</li> <li>• Systems and Quality.</li> <li>• Information and Quality.</li> <li>• IT Hardware and Software.</li> <li>• IT Systems Specification.</li> <li>• IT and Attaining Objectives.</li> <li>• IS Careers.</li> <li>• Ethics and the IS Professional.</li> <li>• IS Theory.</li> <li>• Decision Making, Simon Model.</li> <li>• IS Types.</li> <li>• IS Development Standards.</li> </ul>

<b>Course Code</b>	CS 7113
<b>Course Name</b>	<b>Computer Systems</b> <span style="float: right;">نظم الحاسبات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Gives students whose interest is in software an introduction to hardware and the logical design of digital computers. Topics include design of basic logic modules and arithmetic units; fixed and microprogrammable control structures; computer architecture; memory organization; and input-output organization.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>▪ Components of a computer system and their functional characteristics</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Instruction sets</li> <li>▪ Addressing techniques</li> <li>▪ Input – output processing</li> <li>▪ Interrupts</li> <li>▪ Hardware – software tradeoffs</li> <li>▪ Machine and assembly language</li> </ul>
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<b>Course Code</b>	<b>CS 7114</b>
<b>Course Name</b>	<b>Data Structures</b> هياكل البيانات
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course introduces the fundamental concepts of data structures and the algorithms that proceed from them, the file system fundamentals, and developing skills in the design and implementation of complex software systems.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Secondary Storage Devices Stacks, Queues, Linked Lists, Double-Ended Queues .</li> <li>• Sequences (Ranked Sequences, Positional Sequences, General Sequences) .</li> <li>• Trees (Binary Trees, Data Structures for Representing Trees) .</li> <li>• Priority Queues (Priority Queue as a Sequence, Heaps).</li> <li>• Dictionaries (Binary Search Trees, AVL Trees, Hash Tables).</li> <li>• Sets, Sorting, Selection (Sets, Merge Sort, Quick Sort, Radix Sort Complexity of Sorting, Selection).</li> <li>• Graphs (Data Structures for Graphs, Graph Traversal, Directed Graphs).</li> <li>• Strings (Brute-Force String Pattern Matching, Regular Expression Pattern Matching, Tries).</li> <li>• Record Storage and File Organizations (ordered and unordered files).</li> <li>• Hashing and extendible hashing.</li> <li>• Index structures for files (B-Trees, B+-Trees).</li> </ul>

<b>Course Code</b>	<b>CS 7121</b>
<b>Course Name</b>	<b>Database 1</b> قواعد البيانات (1)
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course is designed to introduce the foundations of database systems, focusing on basics such as the relational algebra and data model, query optimization, query processing, and transactions.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Information models and systems: History and motivation for information systems; information storage and retrieval; information management applications; information capture and representation.</li> <li>• Database systems: History and motivation for database systems; components of database systems; DBMS functions; database architecture and data independence.</li> <li>• Data modeling: Data modeling; conceptual models; object-oriented model; relational data model.</li> <li>• Relational databases: Mapping conceptual schema to a relational schema; entity and referential integrity; relational algebra and relational calculus.</li> <li>• Database query languages: Overview of database languages; SQL; query optimization; 4th-generation environments; embedding non-procedural queries in a procedural language; introduction to Object Query Language.</li> <li>• Relational database design: Database design; functional dependency; normal forms; multivalued dependency; join dependency; representation theory.</li> <li>• Transaction processing: Transactions; failure and recovery; concurrency control.</li> <li>• Distributed databases: Distributed data storage; distributed query processing; distributed transaction model; concurrency control; homogeneous and heterogeneous solutions; client-server.</li> </ul>

	<ul style="list-style-type: none"> <li>Physical database design: Storage and file structure; indexed files; hashed files; signature files; b-trees; files with dense index; files with variable length records; database efficiency and tuning.</li> </ul>
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<b>Course Code</b>	CS 7122
<b>Course Name</b>	Software Engineering هندسة البرمجيات
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course introduces the fundamental principles of software engineering, modern software development techniques and life cycles are emphasized.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>Software processes: Software life-cycle and process models; process assessment models; software process metrics.</li> <li>Software requirements and specifications: Requirements elicitation; requirements analysis modeling techniques; functional and nonfunctional requirements; prototyping; basic concepts of formal specification techniques.</li> <li>Software design: Fundamental design concepts and principles; software architecture; structured design; object-oriented analysis and design; component-level design; design for reuse.</li> <li>Software validation: Validation planning; testing fundamentals, test plan creation and test case generation; black-box and white-box testing techniques; unit, integration, validation, and system testing.</li> <li>Software evolution: Software maintenance; characteristics of maintainable software; reengineering; legacy systems; software reuse.</li> <li>Software project management: Team management; project scheduling; software measurement and estimation techniques; risk analysis; software quality assurance; software configuration management; project management tools.</li> <li>Component-based computing: Fundamentals; basic techniques; applications; architecture of component-based systems; component-oriented design; event handling; middleware.</li> <li>Formal methods: Formal methods concepts; formal specification languages; executable and non-executable specifications; pre and post assertions; formal verification.</li> <li>Software reliability: Software reliability models; redundancy and fault tolerance; defect classification; probabilistic methods of analysis.</li> </ul>

<b>Course Code</b>	IT 7123
<b>Course Name</b>	Computer Networks Fundamentals أساسيات شبكات الحاسب
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This course introduces principles and current trends in computer networks. The ISO Reference Model will be used as the framework with the course progressing through the physical, data link, network, transport, session, and presentation layers.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>Physical and link layer communication: media, signals, and bits; time division and frequency division multiplexing; encoding; modulation; delay, bandwidth, throughput, and noise; error correction techniques; CSMA/CD; CSMA/CA; Ethernet addressing and wiring; hubs.</li> <li>Packet communication: Local Area Network and Wide Area Network technologies; token passing rings; FDDI; wireless networks; network</li> </ul>

	<p>interconnection with repeaters, bridges, and switches; DSU/CSU; xDSL and cable modems; store-and-forward; next-hop forwarding.</p> <ul style="list-style-type: none"> <li>• Internetworking: router-based architecture; IP addressing; address binding with ARP; datagram encapsulation and fragmentation; link-state and distance-vector routing; Dijkstra's algorithm; network properties: ownership and service paradigm; UDP and TCP; TCP segment format; adaptive retransmission; protocol ports; ICMP and error handling.</li> <li>• Network applications: client/server concept; port demultiplexing; socket API; server concurrency; DNS; TELNET; Web technologies including HTML, HTTP, CGI, Java; RPC and middleware; network management.</li> </ul>
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<b>Course Code</b>	<b>CS 7124</b>
<b>Course Name</b>	<b>Object Oriented Programming</b> البرمجة الشيئية
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Introduces the concepts of object-oriented programming to students with a background in the procedural paradigm.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Review of programming fundamentals.</li> <li>• Classes and objects (declaring the class, using the class, calling member functions, constructors).</li> <li>• Classes and objects (destructors, overloaded constructor, member functions defined outside the class, objects as arguments, returning objects from functions, structures versus classes, static class data).</li> <li>• Overloading unary operators (the operator keyword, operator arguments, operator return value).</li> <li>• Overloading</li> <li>• Data conversion (conversion between basic types, conversion between objects and basic types, conversion between objects of different classes).</li> <li>• Inheritance (derived class and base class, derived class constructors, overriding member functions, abstract base class, multiple inheritance).</li> <li>• Templates and exceptions (function templates, class templates, exceptions)</li> <li>• Object-oriented design</li> <li>• Fundamentals of event-driven programming</li> <li>• Introduction to computer graphics: Using a simple graphics API</li> <li>• Virtual machines: The concept of a virtual machine; hierarchy of virtual machines; intermediate languages</li> <li>• Software development methodology: Fundamental design concepts and principles; structured design; testing and debugging strategies; test-case design; programming environments; testing and debugging tools</li> <li>• Software evolution: Software maintenance; characteristics of maintainable software; reengineering; legacy systems; software reuse</li> </ul>

## مقررات الفرقة الثانية

<b>Course Code</b>	<b>IT 7211</b>
<b>Course Name</b>	<b>Data Communications</b> <span style="float: right;">إتصالات البيانات</span>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	The course serves as an introduction to the theory and practice behind many of today's communications systems
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Introduction and Objectives. Block diagram of a digital communication system. Separation of source coding and channel coding.</li> <li>• Fixed-length and variable-length codes for discrete sources. Data compression. Prefix-free codes. The Kraft inequality. Probability models for sources.</li> <li>• Expected code length criterion. Entropy bounds. Huffman codes.</li> <li>• Laws of large numbers. The asymptotic equipartition property. Shannon's source coding theorems.</li> <li>• Compression for discrete-time analog sources. Scalar quantization. Lloyd-Max algorithm. Vector quantization. Entropy quantization.</li> <li>• Differential entropy. High-rate uniform and non-uniform scalar quantizers. High-rate uniform and non-uniform vector quantizers.</li> <li>• Review of Fourier transform, Fourier series, and discrete Fourier transform. <math>L_2</math> functions. The sampling theorem. Data compression for analog waveform sources.</li> <li>• Aliasing. Representation of waveforms by orthonormal expansions. Data compression using orthonormal expansions.</li> <li>• <math>L_2</math> as an inner-product vector space. Subspaces, bases, and dimension. Projection. Gram-Schmidt orthonormalization.</li> <li>• Channel encoding and modulation. Channel decoding and demodulation. Pulse amplitude modulation. Nyquist criterion.</li> <li>• Passband modulation. Quadrature amplitude modulation. Viewing passband at baseband. Implementation of QAM.</li> <li>• Carrier recovery and Phase tracking in QAM. Orthonormal expansions at baseband and passband. Noise and stochastic processes. Gaussian processes. Stationarity.</li> <li>• Linear functionals for Gaussian processes. Jointly Gaussian rv's. Covariance for linear functionals and filters. White Gaussian noise.</li> <li>• The white noise/<math>L_2</math> dichotomy and its resolution. Signal to noise ratio. Channel capacity.</li> <li>• Binary detection. PAM signals in WGN. Binary vectors in WGN. Waveforms in WGN. The Neyman-Pearson test.</li> <li>• The irrelevance theorem. Orthogonal signal sets. Capacity in the broad band limit.</li> <li>• Wireless channels. Physical layer modeling. Free space and fixed antennas. Free space and moving antennas. Moving antennas and multiple paths. Shadowing.</li> <li>• Statistical channel models. Detection in Raleigh fading. Non-coherent detection.</li> <li>• Channel estimation. Rake receivers.</li> <li>• CDMA. Orthogonal codes. Convolutional codes. The Viterbi algorithm. Frequency hopping systems.</li> </ul>

<b>Course Code</b>	<b>IS 7212</b>
<b>Course Name</b>	<b>Systems Analysis and Design</b> تحليل وتصميم النظم
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Students will learn to analyze a business process and document it using function decomposition diagrams, data flow diagrams (DFD), and other modeling techniques. The students will also learn to design system inputs/outputs, and user interface.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Course overview; Review of IS concepts; Role of Modeling in Systems Analysis.</li> <li>• Life cycle phases including systems selection and planning, analysis, logical design, physical design, implementation and operation, maintenance</li> <li>• Techniques for requirements determination, collection, and organization (questionnaires, interviewing, document analysis, observation); joint application design.</li> <li>• (JAD) and other group approaches (e.g., electronic JAD, computer conferencing); prototyping.</li> <li>• Team organization and communication; interviewing, presentation design, and delivery; group dynamics; and leadership.</li> <li>• Project feasibility assessment and risk analysis.</li> <li>• Design reviews and structured walkthroughs.</li> <li>• Object-oriented analysis and design.</li> <li>• Unified Modeling Language (UML).</li> <li>• Data organization and design.</li> <li>• Software and system quality metrics.</li> <li>• Application categories.</li> <li>• Software package evaluation and acquisition.</li> <li>• Globalization issues such as cultural values, information privacy, and data exchange.</li> <li>• Professional code of ethics.</li> </ul>

<b>Course Code</b>	<b>IS 7213</b>
<b>Course Name</b>	<b>Database 2</b> قواعد بيانات (2)
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This is an advanced course on database systems and related information technology
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Logic Query Languages.</li> <li>• Object Models.</li> <li>• Object Query Languages.</li> <li>• Recovery.</li> <li>• Concurrency Control.</li> <li>• Transactions.</li> <li>• Information Integration.</li> <li>• Object-Relational Databases .</li> <li>• Object Oriented Databases.</li> <li>• Query Processing for Object-Oriented Databases.</li> </ul>

<b>Course Code</b>	<b>IT 7214</b>
<b>Course Name</b>	<b>Project</b> المشروع
<b>Compulsory/Elective</b>	Compulsory
<b>Course Syllabus</b>	The project is intended to give the student a chance to put to practical use all the knowledge acquired in his study since he started . It should end with a software package designed to fulfill a predefined task. Throughout the project, the student is encouraged to practice the good procedures needed in all phases of package development, analysis, design, implementation, testing, and deployment. The project may or may not include hardware design and implementation.

<b>Course Code</b>	<b>IT 7221</b>
<b>Course Name</b>	<b>Web-Based Programming</b> برمجة صفحات الويب
<b>Compulsory/Elective</b>	Compulsory
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Internet Fundamentals: addressing, routing, servers</li> <li>• What is Internet Programming?</li> <li>• HTML Basics: Tags, editors, web page design</li> <li>• Style of Web Content: Inline elements, CSS</li> <li>• Introduction to scripting programming</li> <li>• Introduction to Java Basics</li> <li>• Using Java applets: a practical overview</li> <li>• XML and DOM</li> <li>• ADO.Net and DB Processing</li> <li>• ASP.Net , Web Forms and Controls</li> </ul>

<b>Course Code</b>	<b>IS 7222</b>
<b>Course Name</b>	<b>Multimedia Systems</b> نظم الوسائط المتعددة
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	The creation of interactive multimedia products for cross-platform delivery.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>• Introduction to Multimedia Authoring and Production.</li> <li>• The Multimedia Development Process.</li> <li>• Introduction to Multimedia Scripting.</li> <li>• Types of Lingo Scripts / Behaviors / Handlers.</li> <li>• The Sampling Process: Understanding Audio / Video.</li> <li>• Using Lists and Casts.</li> <li>• Understanding Programming Structures.</li> <li>• Human Computer Interface Design.</li> <li>• Graphics, Audio, and Movie File Formats.</li> <li>• Databases, Lists, and Shockwave.</li> <li>• Storage and Delivery Technologies.</li> <li>• Global Development Issues.</li> <li>• Legal Issues, Copyrights, Taxes.</li> </ul>

<b>Course Code</b>	<b>IS 7223</b>
<b>Course Name</b>	<b>E- business</b> الأعمال الإلكترونية
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	Explores what an e-business is and how it is managed. E-Business is an interdisciplinary topic encompassing both business and technology. Basic business aspects and applications throughout the business world include commercial business, government, education, and health services. The major characteristics, opportunities, and limitations of this form of business are explored. Students study various issues and risks that exist in the rapidly changing world of e-business.
<b>Course Syllabus</b>	<ul style="list-style-type: none"> <li>- Technologies related to e-business</li> <li>- Synchronous and Asynchronous environments</li> <li>- Database Management : data warehouse and data mining</li> <li>- Networks related to e-business</li> <li>- Archiving</li> <li>- Web authoring tools</li> <li>- Homepage design</li> <li>- Video streaming</li> <li>- Secure, socket layering</li> <li>- Search engines</li> <li>- Intranets</li> <li>- Internet speed and access</li> <li>- Servers</li> <li>- Knowledge Management</li> </ul>

<b>Course Code</b>	<b>IT 7214</b>
<b>Course Name</b>	<b>Project</b> المشروع
<b>Compulsory/Elective</b>	Compulsory
<b>Course Syllabus</b>	The project is intended to give the student a chance to put to practical use all the knowledge acquired in his study since he started . It should end with a software package designed to fulfill a predefined task. Throughout the project, the student is encouraged to practice the good procedures needed in all phases of package development, analysis, design, implementation, testing, and deployment. The project may or may not include hardware design and implementation.

<b>Course Code</b>	<b>IT 7224</b>
<b>Course Name</b>	<b>Project</b>
<b>Compulsory/Elective</b>	Compulsory
<b>Course Description</b>	This is a continuation to the project of the first semester.