



وزارة التعليم العالي و البحث العلمي

جامعة بابل

كلية هندسة المواد

قسم هندسة المعادن

وصف البرنامج الاكاديمي

قسم هندسة المعادن

الرابط:

<https://cdnx.uobabylon.edu.iq/deps/I5z5zxHj60uJzeV2bOLrfg.pdf>

<https://cdnx.uobabylon.edu.iq/deps/I5z5zxHj60uJzeV2bOLrfg.pdf>

وزارة التعليم العالي والبحث العلمي
جهاز الإشراف والتقويم العلمي
دائرة ضمان الجودة والاعتماد الأكاديمي
قسم الاعتماد الدولي

استمارة وصف البرنامج الأكاديمي للكليات للعام الدراسي 2020-2021



اسم الجامعة : بابل

اسم الكلية: كلية هندسة المواد

عدد الأقسام والفروع العلمية في الكلية : 3

اسم القسم : قسم هندسة المعادن

اسم رئيس القسم : أ.د. سعد حميد الشافعي

تاريخ ملء الملف : 2020

التوقيع

اسم عميد الكلية (المعهد)

أ.د. عماد علي دشر

التاريخ / / 2020

اسم معاون العميد للشؤون العلمية

أ.م.د. عبد الرحيم كاظم عبد علي

التاريخ / / 2020

اسم مدير شعبة ضمان الجودة والأداء الجامعي

أ.م.د. حيدر عبد حسن الجبوري

التاريخ / / 2020

دقق الملف من قبل

قسم ضمان الجودة والأداء الجامعي

اسم مدير قسم ضمان الجودة والأداء الجامعي:

التاريخ / /

نموذج وصف البرنامج الأكاديمي

مراجعة أداء مؤسسات التعليم العالي ((مراجعة البرنامج الأكاديمي))

وصف البرنامج الأكاديمي

يوفر وصف البرنامج الأكاديمي هذا إيجازاً مقتضياً لأهم خصائص البرنامج ومخرجات التعلم المتوقعة من الطالب تحقيقها مبرهنًا عما إذا كان قد حقق الاستفادة القصوى من الفرص المتاحة . ويصاحبه وصف لكل مقرر ضمن البرنامج

١ . المؤسسة التعليمية	جامعة بابل
٢ . القسم الجامعي / المركز	كلية هندسة المواد
٣ . اسم البرنامج الأكاديمي	قسم هندسة المعادن
٤ . اسم الشهادة النهائية	بكلوريوس
٥ . النظام الدراسي	فصلي
٦ . برنامج الاعتماد المعتمد	
٧ . المؤثرات الخارجية الأخرى	دورات تدريبية للطلبة لتطوير المهارات المهنية للطلبة / زيارات ميدانية
٨ . تاريخ إعداد الوصف	٢٠٢٠/٨/ ٢٨
٩ . أهداف البرنامج الأكاديمي	يهدف قسم هندسة المعدن الى أعداد مهندسين قادرين على عمل في مجال الصناعات المعدنية والمواد الحياتية بالإضافة الى قدرتهم على العمل في مجال الفحوصات الهندسية المختلفة لاسيما مايتعلق منها المعدن المستخدمة في مجال البناء والانشاءات

١٠. مخرجات التعلم المطلوبة وطرائق التعليم والتعلم والتقييم

أ- المعرفة والفهم

- ١- أن يتعرف الطالب على بنية وخواص المواد المعدنية
- ٢- أن يكون الطالب قادر على معالجة المواد المعدنية من الناحية التركيبية وتصميم السبائك المختلفة
- ٣- أن يكون قادر على ادخال المواد السيراميكية من كبريتات واكاسيد في تقوية السبائك المعدنية
- ٤- أن يقيم الطالب مواصفات المعادن والسبائك بموجب المواصفات القياسية العالمية

ب -المهارات الخاصة بالموضوع

- ب ١ - معرفة الطالب لمفهوم هندسة المواد وبوجه الخصوص المواد المعدنية
- ب ٢ - قدرة الطالب على تقييم مدى قوة ومتانة المعادن وسبائكها
- ب ٣ - تمكين الطالب من تحليل الاجهادات والعيوب في المسبوكات وكيفية معالجتها

طرائق التعليم والتعلم

- ١- طريقة ألقاء المحاضرات
- ٢- التعلم الالكتروني داخل الحرم الجامعي
- ٣- الرحلات العلمية
- ٤- Student center
- ٥- Work shop ورش العمل
- ٦- المجاميع الطلابية
- ٧- التعلم التجريبي
- ٨- تطبيق التعليم

طرائق التقييم

- ١- Exams
- ٢- Learning
- ٣- Which face
- ٤- Cat (التغذية الراجعة من الطلاب)
- 5- Learning triangle (مثلث التعلم)

ج-مهارات التفكير

- ج ١- مهارة التفكير حسب قدرة الطالب (الهدف من هذه المهارة هو أن يعتقد الطالب بما هو ملموس (قدرات الطالب) وفهم متى وماذا وكيف يجب أن يفكر ويعمل على تحسين القدرة على التفكير بشكل معقول
- ج ٢- مهارة التفكير العالية (الهدف من المهارة) هو تعلم التفكير جيدا قبل أن يتخذ القرار الذي يحدد حياة الطالب
- ج ٣- أستراتيجية التفكير الناقد في التعلم (critical thanking) هو مصطلح يرمز لاعلى مستويات التفكير والتي يهدف الى طرح مشكلة ما و ثم تحليلها منطقيا للوصول الى الحل المطلوب

طرائق التعليم والتعلم

- ١- أستراتيجية التفكير حسب قدرة الطالب .
- ٢- أستراتيجية مهارة التفكير العالية .
- ٣- أستراتيجية التفكير الناقد في التعلم .
- ٤- العصف الذهني .

طرائق التقييم

- ١- Exams
- ٢- Learning
- ٣- Which
- ٤- Learning triangle

- د-المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي).
- ١- التواصل اللفظي (القدرة على التعبير عن التفكير بوضوح والثقة بالكلام
- ٢- العمل الجماعي (العمل بثقة ضمن المجموعة)
- ٣- التحليل والتحقيق (جمع المعلومات بشكل منهجي وعلمي لتأسيس الحقائق والمبادئ لحل المشاكل
- ٤- المبادرة (تحديد الفرص ووضع الافكار والحلول المطروحة)
- ٥- الاتصال الكتابي (القدرة على التعبير عن نفسك بوضوح في الكتابة)
- ٦- التخطيط والتنظيم (القدرة على التخطيط للأنشطة وتنفيذها على نحو فعال)
- ٧- المرونة (التكيف بنجاح مع الاوضاع المتغيرة)
- ٨- إدارة الوقت بفعالية وتحديد أولويات المهام والقدرة على العمل بمواعيد

13. التخطيط للتطور الشخصي

- 1- تحفيز الطالب على التعامل مع اللغات الأجنبية الى جانب اللغة العربية
- 2- القدرة على القيادة في العمل
- 3- القدرة على التأثير على الآخرين وتقييم المطلوب منهم
- 4- القابلية على الاستفادة من المعلومات التي اكتسبها وتوظيفها للواقع العملي

14. معيار القبول (وضع الأنظمة المتعلقة بالالتحاق بالكلية أو المعهد)

مركزي

15. أهم مصادر المعلومات عن البرنامج
- 1- المصادر العربية والأجنبية ذات التخصص
- 2- المجالات العلمية والبحثية
- 3- محاضرات لإساتذة عالميين

مخطط مهارات المنهج																			
يرجى وضع اشارة في المربعات المقابلة لمخرجات التعلم الفردية من البرنامج الخاضعة للتقييم																			
مخرجات التعلم المطلوبة من البرنامج																			
المهارات العامة والمنقولة (أو) المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي				مهارات التفكير				المهارات الخاصة بالموضوع				المعرفة والفهم				أساسي أم اختياري	اسم المقرر	رمز المقرر	السنة / المستوى
4د	3د	2د	1د	4ج	3ج	2ج	1ج	4ب	3ب	2ب	1ب	4أ	3أ	2أ	1أ				
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	المرحلة الأولى/كورس أول		
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	MePOMSi00101(3+0)		
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	MePOSMi100202(2+2)		
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	MePOEDi100303(3+0)		
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	MePOEMi100505(0+4)		

*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	مبادئ هندسة الانتاج I	MePOPEi100 606(4+0)	
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*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	مرحلة I	MePOPi100707(2+2)	المرحلة الأولى/كورس من الثاني
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	لغة انكليزية	MePOELi100808 (2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	حقوق الانسان	MePOHRi10090 9(2+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	رياضيات II	MePOMii101001 (3+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	ميكانيك حرركي	MePODMii1011 02(2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	رسم هندسي II	MePOEDii10120 3(3+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	استخلاص معادن	MePOOCii10130 4(4+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	مواد هندسية II	MePOEMii10140 5(0+4)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	مبادئ هندسة الانتاج II	MePOPEii10150 6(4+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	لغة انكليزية	MePOSLei10170 8(2+0)	

A
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*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	رياضيات I	MePOMi201901(3+2)	المرحلة الثانية/كورس من اول
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	مقدمة مواد I	MePOSMi20200 2(3+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	هندسة معادن	MePOTi202103(3+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	هندسة خامات	MePOPi202204(3+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	مواد لاسمعية	MePOFFi202305 (2+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	مبادئ الهندسة الكيميائية	MePOPEi202507 (4+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	حرية ونمقر اطيع	MePOPEi202608 (2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	الرسم ب الحاسوب	MePOECi202709 (2+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	رياضيات II	MePOMii202801 (3+2)	

*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تطبيقات هندسية	MePOEAi30390 4(3+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	انتقال حرارة	MePOHTi30400 5(2+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تحولات طورية	MePOKRi30410 6(2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تكنولوجيا مساحيق	MePOPi304207(2+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	لغة انكليزية	MePOBi304308(3+2)	

*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	السلوك الميكانيكي للبوليمرات II	MePOMPii304401(3 +2)	المرحلة الثالثة/كور س ثاني
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	خصائص المواد المعدنية	MePOPaii30460 3(2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	هندسة ناكل	MePORPii30470 4(3+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	انتقال حرارة II	MePONaii30480 5(2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تحليلات عديدة	MePOMTii30490 6(2+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	معاملات حرارية	MePOCEii30500 7(2+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	مواد الكترونية ومخاطباتية	MePOBMii3051 08(2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	مواد معدنية متراكبة	MePOSRIi30520 9(3+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	لغة التكلزية	MePOSRIi30520 1	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	عمليات المساحة	Me POTPi405301(3+	المرحلة الرابعة/كور

																		2)	اول
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تطبيقات متالوجيا على الحاسوب I	MePOTii405402(2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تصميم واختيار المواد الهندسية I	MePODMii40550 3(2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	هندسة صناعية	MePOIEii405604(2+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	لثونة I	MePOEPIi405705 (1+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	هندسة اسطح	MePOPCi405806 (3+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	لغة التكلزية	MePOPBii406008 ()	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تكنولوجيا المواد المركبة	MePOTMii40610 1(3+2)	المرحلة الرابعة/كور س ثاني
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تطبيقات ميتالوجيا على الحاسوب II	MePOTIii406202 (2+2)	

*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تصميم واختيار المواد الهندسية II	MePODMii4063 03(3+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	سيطرة نوعية	MePOEPIi40650 5(1+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	لغة التكلزية II	MePOPCii40660 6(3+0)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	تكنولوجيا المواد التأويية	MePOTMii40670 7(1+2)	
*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	اساسي	ميتالوجيا اللحام	MePORPii40680 8()	

Republic of Iraq
Ministry of Higher Education & Scientific
Research Supervision and Scientific
Evaluation Directorate Quality Assurance
and Academic Accreditation International
Accreditation Dept.

Academic Program Specification Form For The Academic

University: University of Babylon
College : materials engineering
Number Of Departments In The College : 3
Department of Metallurgical Engineering
Head of Department: saad hameed AL-shafaie
Date Of Form Completion : 2020



Dean's Name
Date :
Signature
Mr. Dr. Emad Ali
Dasher Al-
Haidari

Dean's Assistant
For Scientific
Affairs
Date : / /
Signature
Mr. Dr. Abdul
Rahim Kazem
Abdul Ali

The College Quality
Assurance And University
Performance Manager
Date : / /
Signature

Quality Assurance And University Performance

Manager Date : / /

Signature

EMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAMME SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	
2. University Department/Centre	Faculty of Materials Engineering
3. Program Title	Department of Metallurgical Engineering
4. Title of Final Award	Bachelor
5. Modes of Attendance offered	quarterly
6. Accreditation	
7. Other external influences	Field visits and summer training
8. Date of production/revision of this specification	28/8/2020
9. Aims of the Program	
1- Preparing competent and qualified engineers to work in the various engineering and industrial sectors	
2- Preparing engineers capable of working in the formations of the Ministry of Industry and Minerals	

3- Providing the surrounding factories and laboratories with qualified engineers, such as the General Company for Mechanical Industries and similar factories

4- Can work as consultants and examiners for various mineral materials

5- Preparing qualified engineers to work in the factories of all industrial companies in the areas of examination and selection of materials, thermal dealings, plumbing, welding, nano and bio-metallic materials.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive goals

A1. - Understand basic engineering concepts

A2- Studying the general concepts of engineering in general

A3- Studying and knowing the engineering of materials of all kinds and their field of application

A4- Focusing on mineral materials and dealing with them in all its operations, from the mine to the final manufacturing

A 5- Knowledge of the basics of materials engineering in general and minerals in particular

A 6-Knowing general priorities about mineral materials and dealing with them.

B. The skills goals special to the programme .

B1 - Skill in reading and analyzing all engineering plans and designs

B2 - Full knowledge of the properties and uses of materials and their selection for specific applications

B3 - Full knowledge of engineering materials and how they are extracted, extracted, manufactured and tested

Teaching and Learning Methods

1- Giving lectures directly to students

2- E-learning by displaying lectures attached to explanatory forms and videos

3- Scientific trips

4- Assigning students to research as seminars and practical scientific research

5- Training in laboratories and factories

Assessment methods

1-Written and oral exams

2- Practical exams

3-Dialogue and direct questions during the lecture time

C. Affective and value goals

C1. Motivate students to reproduce and link information together by posing a question to the students

C 2- Asking intellectual questions that require effort on the part of the student to reach the final result

Teaching and Learning Methods

Develop all available human and laboratory resources to teach students and mentally stimulate them in order to increase their scientific and engineering skills

Assessment methods

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. verbal communication

D 2- Team work

D 3- Practical experiences

D 4- Field visits

Teaching and Learning Methods

1-Lectures in specialized workplaces

2- Laboratory experiments to motivate the student to deal with materials and devices

3- Field identification of production lines and the related process chain

Assessment Methods

1-Direct questions

2- The results obtained by students through practical experiments

3- Providing technical reports on their field visits

11. Program Structure

Level/Year	Course or Module Code	Course or Module Title	Credit rating	12. Awards and Credits
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
1-Motivating the student to deal with foreign languages besides Arabic 2- The ability to lead at work 3- The ability to influence others and achieve what is required of them 4- The ability to benefit from the information gained and use it in practice
14. Admission criteria .
central
15. Key sources of information about the programme
1-Specialized Arab and foreign sources 2- Scientific and research journals 3- Lectures by international professors

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Babylon University
2. University Department/Centre	The Engineering Materials College / Department of Metallurgy
3. Course title/code	Biometals
4. Modes of Attendance offered	weekly
5. Semester/Year	semester
6. Number of hours tuition (total)	30
7. Date of production/revision of this specification	9/10/2020
8. Aims of the Course: Teaching the students, the metals and alloys that used in the human body and their required properties (mechanical properties, corrosion resistance, wear resistance, etc), and the allowable tolerances for this metals and alloys in the human body and the disadvantages for increasing or decreasing their percentage in the body.	
9. Learning Outcomes, Teaching, Learning and Assessment Method.	

A- Cognitive goals

A1. Knowing the types of biomaterials used in the body

A2. Knowing the biggining of metals and alloys using as surgical implants.

A3. Knowing the required biocompatibility for using metals and alloys.

A4. knowing the required properties for using metals and alloys in the body.

A5. Studying the metals and alloys used in the body.

B. The skills goals special to the course.

B1. Acquire skill in determine the properties for each implant.

B2. The capability of metals and alloys selection for each implant application.

B3. The capability of development of alloys for best functional performance.

Teaching and Learning Methods

1- The lecture method

2- The discussion method

Assessment methods

1. The classical discussion during the lecture

2. Make quizzes

3. (oral, monthly and final) examinations to assess the level of students intelligence

C. Affective and value goals

C1. Give hard questions to the students for reaching to the right answers

C2. . Give importance to the subject with respect to time, scientific substance and discipline

C3. Encouragement of right answers & discussion of wrong answers.

Teaching and Learning Methods

1- Using the display screen

2- Discussion

3- Student groups

4- Experimental education

5- Interactive education

Assessment methods

1-direct & abrupt questions

2-large competition inside the class between students for more inducing them on thinking

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1. Verbal communication

D2. Teamwork

D3. Written communication

D4. planning and organizing

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Biomaterials	Introduction to biomaterials	Direct lecture	Give abrupt questions to the students The classical discussion
2	2	Biometals	Introduction to metallic implants	Direct lecture	Give abrupt questions to the students The classical discussion
3	2	Properties of metallic implants	Mechanical properties of metallic implants	Direct lecture	Give abrupt questions to the students The classical discussion
4	2	Properties of metallic implants	Corrosion of metallic implants	Direct lecture	Give abrupt questions to the students The classical discussion
5	2	Types of metallic implants	Stain less steel	Direct lecture	Give abrupt questions to the students The classical discussion
6	2	Types of metallic implants	Shape memory alloys	Direct lecture	Give abrupt questions to the students The classical discussion
7	2	Types of metallic	Shape memory effect	Direct lecture	Give abrupt questions to the

		implants			students The classical discussion
8	2	First month exam			
9	2	Types of metallic implants	CoCr alloys	Direct lecture	Give abrupt questions to the students The classical discussion
10	2	Types of metallic implants	Ti and its alloys	Direct lecture	Give abrupt questions to the students The classical discussion
11	2	Types of metallic implants	Dental metals: Dental amalgam	Direct lecture	Give abrupt questions to the students The classical discussion
12	2	Types of metallic implants	Amalgam Alloy Constituents Effects	Direct lecture	Give abrupt questions to the students The classical discussion
13	2	Types of metallic implants	Gold and its alloys	Direct lecture	Give abrupt questions to the students The classical discussion
14	2	Types of metallic implants	Composite materials	Direct lecture	Give abrupt questions to the students The classical discussion
15	2	Second month exam			

11. Infrastructure

1. Books Required reading:	1- principal texts 2-methodical books 3-other additional sources
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2. Main references (sources)	Biomaterials PRINCIPLES and APPLICATIONS (Edited by JOON B. PARK JOSEPH D. BRONZINO)
A- Recommended books and references (scientific journals, reports...).	BIOMATERIALS
B-Electronic references, Internet sites...	Google, Google Scholar
12. The development of the curriculum plan	
1.Work in conformity with the existing curricula in international universities	
2.follow up in scientific developments with the global education sector	
3.using new applications in mathematical equations and give them to students.	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Babylon University
2. University Department/Centre	The Engineering Materials College / Department of Metallurgical
3. Course title/code	Nano materials
4. Modes of Attendance offered	weekly

5. Semester/Year	semester
6. Number of hours tuition (total)	30
7. Date of production/revision of this specification	9/10/2020
8. Aims of the Course: Teaching the student the properties of nanoparticles and its measuring methods (diameter, shape, density) and the effect of nano size on the physical properties.	

9. Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals

- A1. Knowledge what the nanoparticles is.
- A2. Knowledge the particle size effect on the properties.
- A3. Knowledge the properties which affected by micronization.

B. The skills goals special to the course.

- B1. Acquire skill in determine the appropriate particle size ceramic materials sintering.
- B2. Acquire skill for relationship between particle size and melting point.
- B3. Acquire skill for relationship between particle size and wettability.
- B4. Acquire skill in determine the density of nanoparticles.

Teaching and Learning Methods

- 3- The lecture method
- 4- The discussion method

Assessment methods

- 4. The classical discussion during the lecture
- 5. Make quizzes
- 6. (oral, monthly and final) examinations to assess the level of students intelligence

C. Affective and value goals

- C1. Give hard questions to the students for reaching to the right answers
- C2. . Give importance to the subject with respect to time, scientific substance and discipline
- C3. Encouragement of right answers & discussion of wrong answers.

Teaching and Learning Methods					
6- Using the display screen 7- Discussion 8- Student groups 9- Experimental education 10- Interactive education					
Assessment methods					
1-direct & abrupt questions 2-large competition inside the class between students for more inducing them on thinking					
D. General and rehabilitative transferred skills(other skills relevant to employability and personal development) D1. Verbal communication D2. Teamwork D3. Written communication D4.planning and organizing					

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
١	٢	Size effect and properties of nanoparticles	Definition of nanoparticles	Direct lecture	Give abrupt questions to the students The classical discussion
٢	٢	Size effect and properties of nanoparticles	Features of nanoparticles	Direct lecture	Give abrupt questions to the students The classical discussion
٣	٢	Size effect and properties of nanoparticles	Evaluation of size of nanoparticles	Direct lecture	Give abrupt questions to the students The classical discussion
٤	٢	Properties of nanoparticle and size effect	Morphological/structural properties, Thermal properties	Direct lecture	Give abrupt questions to the students The classical discussion
٥	٢	Properties of nanoparticle and size effect	Electromagnetic properties, Optical properties	Direct lecture	Give abrupt questions to the students

					The classical discussion
٦	٢	Properties of nanoparticle and size effect	Mechanical properties, Melting point	Direct lecture	Give abrupt questions to the students The classical discussion
٧	٢	Properties of nanoparticle and size effect	Wettability, Surface tension	Direct lecture	Give abrupt questions to the students The classical discussion
٨	٢	First month exam			
٩	٢	Particle size	Definition of particle size	Direct lecture	Give abrupt questions to the students The classical discussion
١٠	٢	Particle size	Measuring methods	Direct lecture	Give abrupt questions to the students The classical discussion
١١	٢	Particle shape	Two-dimensional particle projection image Three-dimensional particle image	Direct lecture	Give abrupt questions to the students The classical discussion
١٢	٢	Particle density	Density measurement of powders composed of nanoparticles	Direct lecture	Give abrupt questions to the students The classical discussion
١٣	٢	Specific surface area and pore	Specific surface area and pore	Direct lecture	Give abrupt questions to the students The classical discussion
١٤	٢	Composite structure	Composite structure of nanoparticle	Direct lecture	Give abrupt questions to the students The classical discussion
١٥	٢	Second month exam			

11. Infrastructure

1. Books Required reading:	1- principal texts 2-methodical books 3-other additional sources
2. Main references (sources)	NANOPARTICLE TECHNOLOGY HANDBOOK
A- Recommended books and references (scientific journals, reports...).	Handbook of NANOSCIENCE, ENGINEERING, and TECHNOLOGY
B-Electronic references, Internet sites...	Google, Google Scholar
12. The development of the curriculum plan	
1.Work in conformity with the existing curricula in international universities	
2.follow up in scientific developments with the global education sector	
3.using new applications in mathematical equations and give them to students.	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Babylon
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2. University Department/Centre	Scientific Department / <i>Metallurgical Department</i>
3. Course title/code	Selection of Engineering Materials
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	45 hrs.
7. Date of production/revision of this specification	6/10/2020
8. Aims of the Course	
<p>The primary objective of this course is to outline the importance of concept generation and selection in decision making exercises in a product development.</p> <p>learn how to finalize the product architecture, determine the shape or form of the parts to attain the requisite functions, and quantify the important design parameters.</p>	

9. Learning Outcomes, Teaching ,Learning and Assessment Methode

- A- Cognitive goals .

Knowledge - Remembering or recalling information.

- Comprehension - The ability to obtain meaning from information.
- Application - The ability to use information.
- Analysis - The ability to break information into parts to understand it better.

A. The skills goals special to the course.

By the end of this course, the student will learn

B1) the main goal of material selection is to choose appropriate eco-friendly material for given application with best combination of properties, easy fabrication process, and minimal cost. This course will provide information for each student to learn best practices of material selection from the major sources around the world.

B2) what is a material index and how does it help in selection of material for a given application, and

B3) how to develop material indices considering the appropriate material properties for an intended service.

B4) how to use the typical material indices for the selection of material for common engineering parts.

B5) what is shape factor and how it can be used to enhance the mechanical efficiency of a material, and

B6) how to develop shape factors considering appropriate load and different cross section.

Teaching and Learning Methods

- 1- Interactive lectures at classes
- 2- E-learning on campus
- 3- Scientific trips
- 5- Workshops
- 6- Student groups
- 7- Experiential learning

Assessment methods

- 1- Monthly Exams
- 2- oral assessment
- 3- reports
- 4- Assignments & other activities.
- 5- Quizzes (Shock exams).
- 6- HomeWorks

C. Affective and value goals C1.

C2.

C3.

C4.

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)

D1.

D2.

D3.

D4.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3		Introduction	Lecture	Quiz and oral discussion
2	3		The material property charts	Lecture	Quiz and oral discussion
3	3		Materials selection—the basics	Lecture	Quiz and oral discussion
4	3		The selection strategy	Lecture	Quiz and oral discussion
5	3		Attribute limits and material indices	Lecture	Quiz and oral discussion
6	3		The selection procedure	Lecture	Quiz and oral discussion
7	3		Materials selection—case studies	Lecture	Quiz and oral discussion
8	3		Processes and process selection	Lecture	Quiz and oral discussion
9	3		Process selection case studies	Lecture	Quiz and oral discussion
10	3		Multiple constraints and objectives	Lecture	Quiz and oral discussion
11	3		Traditional methods of dealing with multiple constraints and objectives	Lecture	Quiz and oral discussion
12	3		Case studies—	Lecture	Quiz and oral

			multiple constraints and conflicting objectives		discussion
13	3		Selection of material and shape	Lecture	Quiz and oral discussion
14	3		Selection of material and shape: case studies	Lecture	Quiz and oral discussion
15	3		Information and knowledge sources for design	Lecture	Quiz and oral discussion

11. Infrastructure

1. Books Required reading:	Materials Selection in Mechanical Design by Michael F. Ashby, Third Edition
2. Main references (sources)	Materials Selection in Mechanical Design by Michael F. Ashby, Third Edition
A- Recommended books and references (scientific journals, reports...).	G Dieter, Engineering Design - a materials and processing approach, McGraw Hill, NY, 2000. Materials Science and Engineering AN INTRODUCTION By William D. Callister, JR. & David G. Rethwisch
B-Electronic references, Internet sites...	
12. The development of the curriculum plan	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Scientific Department / Department of Ceramic and Building Materials Engineering
3. Course title/code	Design of Engineering Materials
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester/ Fourth
6. Number of hours tuition (total)	45 hrs.
7. Date of production/revision of this specification	2/10/2020
8. Aims of the Course	
<p>The primary objective of this course is to outline the importance of concept generation and selection in decision making exercises in a product development.</p> <p>learn how to finalize the product architecture, determine the shape or form of the parts to attain the requisite functions, and quantify the important design parameters.</p>	

9. Learning Outcomes, Teaching ,Learning and Assessment Methode

- A- Cognitive goals .

Knowledge - Remembering or recalling information about materials data .

- Comprehension - The ability to obtain meaning and understanding from information.
- Application - The ability to use this information in design of mechanical parts.
- Analysis - The ability to break information into parts to understand it better through analysis the design product mechanically and economically.

B. The skills goals special to the course.

By the end of this course, the student will learn

B1) Design strategy of materials and selection of materials for design

B2) Clarify the basic steps in the design process.

B3) Recognize and develop lists of independent and dependent parameters for a mechanical design from which to develop quantitative measures of performance.

B4) Develop optimization equations for selection of materials for defined design projects.

B5) Use methods of design on a base of minimization of conflict between environmental impact, total costs and functional characteristics of new items.

Teaching and Learning Methods

- 2- Interactive lectures at classes
- 2- E-learning on campus
- 3- Scientific trips
- 5- Workshops
- 6- Student groups
- 7- Experiential learning

Assessment methods

- 7- Monthly Exams
- 8- oral assessment
- 9- reports
- 10- Assignments & other activities.
- 11- Quizzes (Shock exams).
- 12- HomeWorks

C. Affective and value goals C1.

C2.

C3.

C4.

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)

D1.

D2.

D3.

D4.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3		Introduction	Lecture	Quiz and oral discussion
2	3		Materials in design	Lecture	Quiz and oral discussion
3	3		The design process	Lecture	Quiz and oral discussion
4	3		The Environment of Materials Design	Lecture	Quiz and oral discussion
5	3		Design tools and materials data	Lecture	Quiz and oral discussion
6	3		Design tools and materials data	Lecture	Quiz and oral discussion
7	3		Function, material, shape, and process	Lecture	Quiz and oral discussion
8	3		Engineering materials and their properties	Lecture	Quiz and oral discussion
9	3		Engineering materials and their properties	Lecture	Quiz and oral discussion
10	3		Exploring material properties	Lecture	Quiz and oral discussion
11	3		Designing hybrid materials	Lecture	Quiz and oral discussion
12	3		Designing hybrid materials	Lecture	Quiz and oral discussion
13	3		Hybrid case studies	Lecture	Quiz and oral discussion
14	3		Hybrid case studies	Lecture	Quiz and oral discussion
15	3		statistics in fracture (Weibull Modulus)	Lecture	Quiz and oral discussion

11. Infrastructure

1. Books Required reading:	Materials Selection in Mechanical Design by Michael F. Ashby, Third Edition
2. Main references (sources)	Materials Selection in Mechanical Design by Michael F. Ashby, Third Edition
A- Recommended books and references (scientific journals, reports...).	(i) J. G. Gerdeen, H. W. Lord and R. A. L. Rorrer, Engineering Design with Polymers and Composites, Taylor & Francis, 2005 (ii) M. F. Ashby and K. Johnson, Materials and Design,

	Butterworth Publication, 2002 (iii) D.R. Askeland and P.P. Phule, The Science and Engineering of Materials, Thomson Brooks/Cole Publication, 4th edition, 2006
B-Electronic references, Internet sites...	
12. The development of the curriculum plan	

TEMPLATE FOR COURSE SPECIFICATION

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This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Scientific Department / Department of Metallic Materials Engineering
3. Course title/code	Metallurgical applications with computers.
4. Modes of Attendance offered	Weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	45

7. Date of production/revision of this specification	15/9/2020
8. Aims of the Course	
<p>Introducing the Plotting of experimental data, Label of graphs, Best fitting equations have been presented. knowing Laminator program: analysis of composite laminates, Classical lamination theory, Case studies are done. knowing Finite element and finite difference methods. learning Drawing: key points, lines, areas Volumes: blocks, cylinders prism and cones, operations ,extrude and add, subtract, overlap glue operations. knowing Types of elements and meshing. knowing Analysis types, static, transient harmonic</p> <p>Real constant and section properties learning analysis of bar structures and analysis of uniformly distributed beams. Two dimensional elasticity . knowing analysis of axisymmetry problems . Analysis of die castings, heat transfer in two dimensions. student to the basic principles of analysis of metallurgical applications with ansys.</p>	

9. Learning Outcomes, Teaching ,Learning and Assessment Methods

- A- Building integrated projects in terms of interfaces and characteristics and writing equations related to metalworking.
- B- How to choose the appropriate cutting tool for metal cutting.

B. The skills goals special to the course.

Design the appropriate number and measure cutting speed and cutting forces by mathematical and graphic methods

Teaching and Learning Methods

- 1- Using the display screen
- 2- Discussion
- 3- Student groups
- 4- Experiential education
- 5- Interactive education

Assessment methods

- 1- Using the display screen
- 2- Discussion
- 3- In-class effectiveness
- 4- Daily exams
- 5- Semester exams
- 6- Final exam

C. Affective and value goals C1-
Written exams
C2- Semester exams
C3 - Final exams
C4- Daily assessment

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1 Verbal communication (the ability to express thinking clearly and confidently in speech)
D2 Teamwork (working with confidence within the group)
D3 Written communication (the ability to express yourself clearly in writing)
D4 Planning and Organizing (the ability to plan and implement activities effectively)

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	9	Learn plotting and drawing and laminator program.	Plotting of experimental data and materials properties in laminator program.	Direct lecture to	surprise exams
4+5	4	Knowing types of elements and meshing	Types of element and meshing	Direct lecture to students	surprise exams
6-8	6	Learn how to consider boundary conditions and solving.	Boundary conditions supports and forces and moments	Direct lecture to students	surprise exams
9+10	4	Learn how to analyse beams and bars	Concentrated beams and uniform loading beams	Direct lecture to students	surprise exams
11-13	6	Knowing the analysis of plane stress and plain strains	Plane stress with two dimension analysis	Direct lecture to students	surprise exams

14+15	4	Heat and fluid analysis using flotran program.	Thermal analysis with insulated edge	Direct lecture to students	surprise exams final examination
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11. Infrastructure

1. Books Required reading:	
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	1- Engineering analysis with ansys software, Yashimoto 2006. 2- Finite element analysis with ansys, Saeed Moviny 2018.
B-Electronic references, Internet sites...	

12. The development of the curriculum plan

- 1- Work in conformity with the existing curricula in international universities.
- 2- Follow up on scientific developments within the global education sector.
- 3- Scientific communication with the latest scientific developments within the scientific specialization.
- 4- Using the latest versions of specialized software deals with fluid flow like Ansys.
- 5- Going towards the latest publications from international scientific sources.

TEMPLATE FOR COURSE SPECIFICATION

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COURSE SPECIFICATION

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1. Teaching Institution	University of Babylon
2. University Department/Centre	Department of Metallic Materials Engineering
3. Course title/code	Plasticity Engineering
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	15
7. Date of production/revision of this specification	15/10/2020
8. Aims of the Course	
<p>This course aims to learning the students' wide information about plasticity engineering. The first was introduction to plasticity. Then study the stress-strain relations, engineering stress-strain and true stress then plastic deformation theory and its laws. The mechanisms of deformation explained in details. The crystals defects also, in details covered in the lectures. The factors that effect on yield strength then explained. The flue stress, strain hardening index and strength coefficient laws explained in details. Work done during plastic deformation also has been given enough attention. Effect of strain rate, temperature and the hydrostatic pressure on the mechanical behavior of metals The effect of strain rate, temperature and hydrostatic pressure on the mechanical behavior of metals is explained through the lectures</p>	

9. Learning Outcomes, Teaching ,Learning and Assessment Methods

C- Cognitive goals .

A1- Introducing the plasticity

A2 - How to deal with calculation flow stress.

A3-Study Strain rate, strain rate sensitivity and effect of strain rate, temperature and hydrostatic pressure on the mechanical behavior of metals.

B. The skills goals special to the course.

After the course ends, the student will learn how to deal with plasticity, plastic deformation mechanisms, and flow stress curve calculations.

Teaching and Learning Methods

- 1- Using the display screen
- 2- Discussion
- 3- Student groups
- 4- Experiential education
- 5- Interactive education

Assessment methods

- 1- Using the display screen
- 2- Discussion
- 3- In-class effectiveness
- 4- Daily exams
- 5- Semester exams
- 6- Final exam

C. Affective and value goals C1-

Written exams

C2- Semester exams

C3 - Final exams

C4- Daily assessment

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)

D1 Verbal communication (the ability to express thinking clearly and confidently in speech)

D2 Team work (working with confidence within the group)

D3 Written communication (the ability to express yourself clearly in writing)

D4 Planning and Organizing (the ability to plan and implement activities effectively)

10. Course Structure

Week	Hou rs	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	9	Stress-Strain Relations	<ul style="list-style-type: none"> • Introduction • Engineering Stress–Strain • flow curve 	Direct lecture to students	surprise exams
4-6	9	Mechanisms of Deformation	<ul style="list-style-type: none"> • Glide (Slip) Systems and Ease of Deformation 		

			<ul style="list-style-type: none"> • Plastic deformation by Slip • Crystal Defects • <i>Dislocations</i> • <i>Planar defects. Grain Boundaries. Polycrystals</i> • <i>A low-angle grain boundary</i> • <i>A high-angle grain boundary</i> • <i>Stacking fault</i> • Deformation by twinning 	Direct lecture to students	surprise exams
7-9	9	Factors that affect the yield strength	<ul style="list-style-type: none"> • Strain Hardening and flow stress • Strain hardening • Bauschinger effect • Strain hardening Index • Determination of strain hardening index • Exercise • Work Done During Plastic Deformation • Exercise 	Direct lecture to students	surprise exams
10-12	9	Effect of strain rate, temperature and the hydrostatic pressure on the mechanical behavior of metal	<ul style="list-style-type: none"> • Strain rate • Factors affecting the stress-strain behavior • Strain rate effect • Strain rate sensitivity • Hydrostatic stress • Effect of temperature on flow stress • Exercise 	Direct lecture to students	surprise exams
13-15	9	General exercises	Questions and Answers	Direct lecture to students	surprise exams final examination

11. Infrastructure

1. Books Required reading:	Mechanics of Sheet Metal Forming By: Z. Marciniak
2. Main references (sources)	FUNDAMENTALS OF MODERN MANUFACTURING Fourth Edition Mikell P. Groover
A- Recommended books and references (scientific journals, reports...).	METAL FORMING Mechanics and Metallurgy THIRD EDITION WILLIAM F. HOSFORD
B-Electronic references, Internet sites...	

12. The development of the curriculum plan

- 1- Work in conformity with the existing curricula in international universities.
- 2- Follow up on scientific developments within the global education sector.
- 3- Scientific communication with the latest scientific developments within the scientific specialization.
- 4- Using the latest versions of specialized software deals with fluid flow like Ansys.
- 5- Going towards the latest publications from international scientific sources.

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/ she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Department of Metallic Materials Engineering
3. Course title/code	Forming Engineering
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	15
7. Date of production/revision of this specification	16/9/2020
8. Aims of the Course	

This course aims to learning the students' wide information about Forming engineering. The first was introduction to metals forming. Then study briefly, the plastic deformation theory and its laws. The different operations of metals forming in details were covered, like forging, extrusion, drawing and its applications. Then study the sheet forming operations like deep drawing, cutting, bending and folding and its applications.

9. Learning Outcomes, Teaching ,Learning and Assessment Methods

D- Cognitive goals .

A1- Introducing the forming of metals and their alloys, methods and devices used in their implementation.

A2 - How to deal with calculation the load and power of forming instruments.

A3-Study types of lubricants and usage in forming of metals and its alloys.

B. The skills goals special to the course.

After the course ends, the student will learn how to deal with metals forming, the type of appropriate method for forming, and how to calculate the necessary power for forming.

Teaching and Learning Methods

1- Using the display screen

2- Discussion

3- Student groups

4- Experiential education

5- Interactive education

Assessment methods

1- Using the display screen

2- Discussion

3- In-class effectiveness

4- Daily exams

5- Semester exams

6- Final exam

C. Affective and value goals C1-

Written exams

C2- Semester exams

C3 - Final exams

C4- Daily assessment

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1 Verbal communication (the ability to express thinking clearly and confidently in speech)

D2 Team work (working with confidence within the group)

D3 Written communication (the ability to express yourself clearly in writing)

D4 Planning and Organizing (the ability to plan and implement activities effectively)

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	9	Introduction to metals forming	<ul style="list-style-type: none"> • Overview of Metal Forming • Bulk Deformation Processes • Sheet Metalworking • Material Behavior in Metal Forming • Flow Stress • Average Flow Stress • Temperature in Metal Forming • Cold, warm and hot working • Strain Rate Sensitivity • Friction and Lubrication in Metal Forming 	Direct lecture to students	surprise exams
4-6	9	Bulk forming processes	<ul style="list-style-type: none"> • Forging • Open die forging • Closed die forging • Exercises • Flashless forging • Making coins • Forging hammers, presses and dies • Forging Hammers • Power drop hammers • Forging Presses • Mechanical presses • Hydraulic presses • Forging Dies • Other forging operations • Swaging and Radial Forging • Roll Forging • Orbital forging 	Direct lecture to students	surprise exams

			<ul style="list-style-type: none"> • Isothermal forging • Exercises 		
7-9	9	Extrusion processes	<ul style="list-style-type: none"> • Types of extrusion • Direct extrusion • Indirect extrusion • Analysis of extrusion • Exercises • Defects in Extruded Products • Sliding friction • Sticking friction • Exercises 	Direct lecture to students	surprise exams
10-12	9	Rolling processes	<ul style="list-style-type: none"> • Important terminologies • Flat rolling and its analysis • Roll force, torque, and power requirements Roll force, torque, and power requirements • Exercises • Rolling mills • Various Rolling Processes and Mills • Skew Rolling, Ring rolling • Thread Rolling • Rotary Tube Piercing or Roll Piercing • Roll bending • Sheet forming • Cup deep drawing • Quantification of cup drawability • Exercises 	Direct lecture to students	surprise exams
13-15	9	Wire, rod, bar drawing	<ul style="list-style-type: none"> • Difference between wire drawing and rod drawing • Analysis of wire drawing • Exercise • Maximum reduction per pass • Tube Drawing: • Drawing Practice • Advantages of drawing • Bundle Drawing • Drawing Equipment • Drawing Dies • Drawing Defects and Residual Stresses • Exercises 	Direct lecture to students	surprise exams final examination

11. Infrastructure	
1. Books Required reading:	Mechanics of Sheet Metal Forming By: Z. Marciniak
2. Main references (sources)	FUNDAMENTALS OF MODERN MANUFACTURING Mikell P. Groover
A- Recommended books and references (scientific journals, reports...).	METAL FORMING Mechanics and Metallurgy THIRD EDITION WILLIAM F. HOSFORD
B-Electronic references, Internet sites...	
12. The development of the curriculum plan	
1- Work in conformity with the existing curricula in international universities. 2- Follow up on scientific developments within the global education sector. 3- Scientific communication with the latest scientific developments within the scientific specialization. 4- Using the latest versions of specialized software deals with fluid flow like Ansys. 5- Going towards the latest publications from international scientific sources.	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Babylon
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2. University Department/Centre	Scientific Department / Department of Metallic Materials Engineering
3. Course title/code	Electronic and Magnetic Materials
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	15
7. Date of production/revision of this specification	10/9/2020
8. Aims of the Course	
Introducing the student to the basic principles of electronic and magnetic materials with its various applications. Knowing electrical conductivity ,semiconductor materials and application .Knowing of super conductivity .Studying magnetic and origin of magnetic .Studying types of magnetic materials and laws.	

9. Learning Outcomes, Teaching ,Learning and Assessment Methode
<p>A- The student recognizes of materials and relationship of electrons .</p> <p>B- How to reasons happening of electrical and magnetic..</p>
<p>B. The skills goals special to the course.</p> <p>How electrical conductivity ,semiconductor and how happens breackdown of dielectric. Origin of magnetic.</p>
Teaching and Learning Methods
<p>1- Using the display screen</p> <p>2- Discussion</p> <p>3- Student groups</p> <p>4- Experiential education</p> <p>5- Interactive education</p>
Assessment methods

- 1- Using the display screen
- 2- Discussion
- 3- In-class effectiveness
- 4- Daily exams
- 5- Semester exams
- 6- Final exam

C. Affective and value goals C1-
Written exams
C2- Semester exams
C3 - Final exams
C4- Daily assessment

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1 Verbal communication (the ability to express thinking clearly and confidently in speech)
D2 Teamwork (working with confidence within the group)
D3 Written communication (the ability to express yourself clearly in writing)
D4 Planning and Organizing (the ability to plan and implement activities effectively)

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	6	Electrical conductivity, semiconductor and band of energy	Introduction and studying laws.	Direct lecture to Equilibrium of A Fluid Element Hydrostatic Pressure students	surprise exams
4+5	4	Concept of Fermi level and Solar cell and manufacture photo-resistance	Knowing concept of Fermi, functions Fermi and photo-resistance	Direct lecture to students	surprise exams
6-8	6	Diode and transistor .Dielectric materials. Principles of dielectric polarization	How is manufacture diode and types of dielectric	Direct lecture to students	surprise exams
9+10	4	Dielectric break down, Superconductivity	How happens breakdowns and Mazner effect	Direct lecture to students	surprise exams

		ve materials and Mazner effect			
11-13	6	Magnetic materials ,origin of magnetic and ferromagnetic	Studying magnetic materials	Direct lecture to students	surprise exams
14+15	4	Paramagnetic and Diamagnetic materials	Study of different between of materials	Direct lecture to students	surprise exams final examination

11. Infrastructure

1. Books Required reading:	
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	1-Materials science structure and characterization of polycrystalline materials ,Vadimir vovilov .2003. 2-Intrent. 3-Phasicalmatallurgy.Robertw.catn and peter Haasan Fourth edition .
B-Electronic references, Internet sites...	

12. The development of the curriculum plan

- 1- Work in conformity with the existing curricula in international universities.
- 2- Follow up on scientific developments within the global education sector.
- 3- Scientific communication with the latest scientific developments within the scientific specialization.

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides an overview of the concepts of heat transfer. This may be useful in engineering. Also it gives an introduction of the most important methods of heat transfer by conduction, convection and radiation. This enhance student idea to recognize, describe and represent numbers and their relationships, and to count, estimate, calculate and check with competence and confidence in solving problems.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Scientific Department / Department of Metallic Materials Engineering
3. Course title/code	Heat Transfer
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	60
7. Date of production/revision of this specification	15/9/2020
8. Aims of the Course	
Introducing the student to the basic principles of heat transfer with its various applications. Where different methods of heat transfer are studied that enable the student how to properly used to calculate and solving the problems. Then studying the types of heat exchangers and their importance in the different industrial applications. This will enhance the ability of students to deal with different types of heat flows and calculate the heat transfer rate . in addition to identifying the heat transfer through the fins.	

9. Learning Outcomes, Teaching ,Learning and Assessment Method

1. Understand the general form of the heat transfer methods and identify their equation.
2. Learn how to identify and apply charts and table of heat transfer to be able to solve the problems.
3. Introduce different types of heat exchangers and their practical applications.

Teaching and Learning Methods

- 1- Discussion
- 2- Using the display screen
- 3- Student groups
- 4- Experiential education
- 5- Interactive education

Assessment methods

- 1- Using the display screen
- 2- Discussion
- 3- In-class effectiveness
- 4- Daily exams
- 5- Semester exams
- 6- Final exam

C. Affective and value goals

- C1- Written exams
- C2- Semester exams
- C3 - Final exams
- C4- Daily assessment

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)

- D1 Verbal communication
- D2 Teamwork groups
- D 3 Written communication
- D 4 Planning and Organizing

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
30	60	Learn how to get the knowledge and idea in heat transfer science	An overview of the concepts of heat transfer including Introduction and classification of the main method of heat transfer, heat exchangers, fins.	Direct lecture to students	surprise exams and home works , experimental lab, questions and answer in class

11. Infrastructure	
1. Books Required reading:	
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	<p>Basic texts</p> <ul style="list-style-type: none"> * Heat Transfer bt Holman 7 edition Yunus A Cengel; Heat Transfer, A Practical Approach • Any modern source about the course can be used
B-Electronic references, Internet sites...	Google
12. The development of the curriculum plan	
<p>1- Work in conformity with the existing curricula in international universities.</p> <p>2- Follow up on scientific developments within the global education sector.</p> <p>3- Scientific communication with the latest scientific developments within the scientific specialization.</p>	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programmed specification.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Scientific Department / Department of Metallurgical Engineering
3. Course title/code	Metal Matrix Composite
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	30
7. Date of production/revision of this specification	12/9/2020
8. Aims of the Course	
<p>The course aims to study composite materials, their history and types, depending on the classification of reinforcing materials (particle reinforcement, dispersion reinforcement and fiber reinforcement) or depending on the type of base material, studying the law of mixtures and how to use it in calculating resistance, density, electrical and thermal conductivity. The course also aims to study the factors affecting the manufacture of an efficient composite material. Also learn about the uses of composite materials, traditional and advanced manufacturing methods, and modern applications of composite materials.</p>	

9. Learning Outcomes, Teaching ,Learning and Assessment Method

C- Cognitive goals .

A1- Building integrated projects in terms of interfaces and properties and writing equations related to metal matrix composite and its basics. .

A2 - How to deal with engineering problems related to metal matrix composite and how to address them to improve its properties.

B. The skills goals special to the course.

Constructive dealing with engineering specifications related to the manufacture and examination of a composite material with a metal basis and with high-quality engineering and physical specifications such as density and porosity tests, elastic modulus, tensile strength, wear and fatigue, and in accordance with the specialization of students in the Department of Metallurgical Engineering

Teaching and Learning Methods

- 1- Using the display screen
- 2- Discussion
- 3- Student groups
- 4- Experiential education
- 5- Interactive education

Assessment methods

- 1- Using the display screen
- 2- Discussion
- 3- In-class effectiveness
- 4- Daily exams
- 5- Semester exams
- 6- Final exam

C. Affective and value goals

- C1- Written exams
- C2- Semester exams
- C3 - Final exams
- C4- Daily assessment

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1 Verbal communication (the ability to express thinking clearly and confidently in speech)

D2 Teamwork (working with confidence within the group)

D3 Written communication (the ability to express yourself clearly in writing)

D4 Planning and Organizing (the ability to plan and implement activities effectively)

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	6	To describe types of matrix and reinforcement phases	Define principle of composite materials	Direct lecture to students	surprise exams
4+5	4	Particulate and Dispersion-Strengthened Composites, Cite the difference in strengthening mechanism for large-particle and dispersion-strengthened particle-reinforced composites.	physical and metallurgical parameters of composite materials	Direct lecture to students	surprise exams
6-8	6	Characteristics of Fiber-Reinforced Composites, Calculate longitudinal modulus and longitudinal strength for an aligned and continuous fiber-reinforced composite	Fiber-Reinforced Composites	Direct lecture to students	surprise exams
9+10	4	several techniques (pultrusion, filament	Manufacturing Fibers and Composite	Direct lecture to students	surprise exams

		winding, and prepregs production processes) by which useful products of these materials are manufactured will be discussed			
11-13	6	Composites used for many structural applications are commonly prepared using a lay-up operation (either hand or automated), wherein prepregs tape plies are laid down on a tooled surface and are subsequently fully cured by the simultaneous application of heat and pressure composites in sport applications	Fiber-Reinforced Systems and Applications	Direct lecture to students	surprise exams
14+15	4	Composite in space applications and sport applications Laminar composites are built of layers of deferent materials. These layers may be sheets of deferent metals, with one metal providing	Advanced composite	Direct lecture to students	surprise exams final examination

	strength, and the other providing hardness or corrosion resistance. Sandwich materials, including honeycombs, are exceptionally lightweight laminar composites, with solid facings joined to an almost hollow core			
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11. Infrastructure

1. Books Required reading:	
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	<ol style="list-style-type: none"> 1. Peters, Stanley T., ed. Handbook of composites. Springer Science & Business Media, 2013. 2. Kainer, Karl Ulrich. Basics of metal matrix composites. Wiley-VCH GmbH & Co. KGaA, Weinheim, Germany, 2006. 3. Askeland, Donald R., Pradeep P. Fulay, and Wendelin J. Wright. "The Science and Engineering of Materials,—6th ed., Cengage Learning." (2010): 06-21. 4. Dieter, George Ellwood, and David J. Bacon. Mechanical metallurgy. Vol. 3. New York: McGraw-hill, 1986. 5. W. D. Callister, Jr. "Materials Science and Engineering An Introduction" seventh edition, Copyright © 2007 John Wiley & Sons, Inc.
B-Electronic references, Internet sites...	

12. The development of the curriculum plan

- 1- Work in conformity with the existing curricula in international universities.
- 2- Follow up on scientific developments within the global education sector.
- 3- Scientific communication with the latest scientific developments within the scientific specialization.

- 4- Using the latest versions of specialized software deals with metal matrix composite.
- 5- Going towards the latest publications from international scientific sources.

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Scientific Department / Department of Metallic Materials Engineering
3. Course title/code	Numerical Analysis
4. Modes of Attendance offered	Weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	30
7. Date of production/revision of this specification	12/9/2020
8. Aims of the Course	
<p>Providing students with the basics of scientific knowledge and improving their professional abilities in the direction of analytical and creative thinking through the use of information technologies, data analysis and modern experimental methods in formulating and solving problems and preparing well-qualified engineers to improve</p>	

engineering activities and the ability to manage dealing with them in all aspects of life.

9. Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals .

A1- Broad-based education to understand the impact of engineering solutions globally and economically.

A2- Ability to work in multidisciplinary teams.

A3 - The possibility of designing and implementing experiments, analyzing the results and translating them into reality.

A4- The ability to design systems to meet the required needs within realistic economic determinants.

B. The skills goals special to the course.

B1 - Using the least teaching methods in line with the level of the students and allowing the students to discuss.

B 2- Using modern and advanced means to deliver the largest amount of knowledge to the student.

B 3- Activating the role of educational guidance in the matter.

Teaching and Learning Methods

1- Using the display screen

2- Discussion

3- Student groups

4- Experiential education

5- Interactive education

Assessment methods

1- Using the display screen

2- Discussion

3- In-class effectiveness

4- Daily exams

5- Semester exams

6- Final exam

C. Affective and value goals C1-
Written exams
C2- Semester exams
C3 - Final exams
C4- Daily assessment

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

1 Develop the student's ability and ability to use computer programs in the field of specialization.

2 Develop the student's ability and ability to deal with modern technologies related to the course vocabulary.

3 Develop and develop the student's ability and ability to face problems and dilemmas and find appropriate solutions.

4 Develop the student's ability and ability to translate academic information into practical reality.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Introduction to numerical method		Direct lecture to students	surprise exams
2	2	Errors and measurment		Direct lecture to students	surprise exams
3	2	Solution of Algebraic and Transcendental Equations • Locate of the root • Method of Bisection • Secant Method • False position method		Direct lecture to students	surprise exams
4+5	4	Solution of Algebraic and Transcendental Equations • NewtonRaphson for Two Equations • Iterative Method for Two Equations		Direct lecture to students	surprise exams
6+7	4	Operations with Matrices Addition/Subtraction c alar Multiplication Matrix Multiplication Identity Matrix		Direct lecture to students	surprise exams final examination
8	2	Gauss Seidel		Direct lecture to students	surprise exams
9	2	Direct Method of Interpolation		Direct lecture to students	surprise exams
10	2	Lagrangian Interpolation		Direct lecture to students	surprise exams
11+12+13	6	Numerical Differentiation		Direct lecture to students	surprise exams
14+15	4	Numerical Differentiation and Integration		Direct lecture to students	surprise exams final examination

11. Infrastructure	
1. Books Required reading:	1-Numerical Methods for Engineers, Steven C. Chapral
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	
B-Electronic references, Internet sites...	Numerical Methods for Engineers, Steven C. Chapra L Shampine, L. F. (1994). Numerical solution of ordinary differential equations (Vol. 4): CRC Press.
12. The development of the curriculum plan	
1- Work in conformity with the existing curricula in international universities. 2- Follow up on scientific developments within the global education sector. 3- Scientific communication with the latest scientific developments within the scientific specialization. 4- Using the latest versions of specialized software deals with fluid flow like Ansys. 5- Going towards the latest publications from international scientific sources.	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Scientific Department / Department of Metallic Materials Engineering
3. Course title/code	Engineering Analysis

4. Modes of Attendance offered	Weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	45
7. Date of production/revision of this specification	15/9/2020
8. Aims of the Course	
<p>Providing students with the basics of scientific knowledge and improving their professional abilities in the direction of analytical and creative thinking through the use of information technologies, data analysis and modern experimental methods in formulating and solving problems and preparing well-qualified engineers to improve engineering activities and the ability to manage dealing with them in all aspects of life.</p>	

9. Learning Outcomes, Teaching ,Learning and Assessment Methode
<p>A- Cognitive goals .</p> <p>A1- Broad-based education to understand the impact of engineering solutions globally and economically.</p> <p>A2- Ability to work in multidisciplinary teams.</p> <p>A3 - The possibility of designing and implementing experiments, analyzing the results and translating them into reality.</p> <p>A4- The ability to design systems to meet the required needs within realistic economic determinants.</p> <p>B. The skills goals special to the course.</p> <p>B1 - Using the least teaching methods in line with the level of the students and allowing the students to discuss.</p> <p>B 2- Using modern and advanced means to deliver the largest amount of knowledge to the student.</p> <p>B 3- Activating the role of educational guidance in the matter.</p>
Teaching and Learning Methods

- 1- Using the display screen
- 2- Discussion
- 3- Student groups
- 4- Experiential education
- 5- Interactive education

Assessment methods

- 1- Using the display screen
- 2- Discussion
- 3- In-class effectiveness
- 4- Daily exams
- 5- Semester exams
- 6- Final exam

C. Affective and value goals C1-
Written exams
C2- Semester exams
C3 - Final exams
C4- Daily assessment

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)

- 1 Develop the student's ability and ability to use computer programs in the field of specialization.
- 2 Develop the student's ability and ability to deal with modern technologies related to the course vocabulary.
- 3 Develop and develop the student's ability and ability to face problems and dilemmas and find appropriate solutions.
- 4 Develop the student's ability and ability to translate academic information into practical reality.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	9	Properties of Laplace transformation & Laplace inverse	The Concept of A Fluid (Newtonian And Non-Newtonian Fluid) Viscosity, Units of Viscosity, Dynamic Viscosity, Kinematic Viscosity Viscosity Measurements Equilibrium of A Fluid Element Hydrostatic Pressure	Direct lecture to students Equilibrium of A Fluid Element Hydrostatic Pressure	surprise exams
4+5	6	Laplace transformation to solve O.D.E.	Equations of Motion and Potential Flow Conservation of Mass, Conservation of Momentum,	Direct lecture to students	surprise exams

			Conservation of Energy, Differential Relations for Fluid Motion, Analysis of Rate of Deformation		
6-8	9	Power series	The Concept of Laminar Fluid Flow The Concept of Turbulent Fluid Flow	Direct lecture to students	surprise exams
9+10	6	Fourier transformation	Hydraulics of Pipe Systems, Basic Computations, Fluid Friction, Pipe Design and Pipe Materials	Direct lecture to students	surprise exams
11-13	9	Study the relations and drive the boundary layers equations	Similitude: Dimensional Analysis and Data Correlation And Boundary layer	Direct lecture to students	surprise exams
14+15	6	Theories and procedures	Non-Newtonian Fluids Classification of Non-Newtonian Fluids Apparent Viscosity Constitutive Equations Rheological Property Measurements Fully Developed Laminar Pressure Drops for Non-Newtonian Fluids Fully Developed Turbulent Flow Pressure Drops	Direct lecture to students	surprise exams final examination

11. Infrastructure

1. Books Required reading:	
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	<p>Basic texts</p> <p>* Kreith, F.; Berger, S.A.; et. al. "Fluid Mechanics" <i>Mechanical Engineering Handbook</i> Ed. Frank Kreith Boca Raton: CRC Press LLC, 1999</p> <p>Verbeeten, Wilco M.H. "Computational Polymer Melt Rheology" Technische Universiteit Eindhoven, 2001.</p>

	<p>Ron darby "Chemical Engineering Fluid Mechanics", second edition, Marcel Dekker, Inc. 2001.</p> <p>Bruce E. Larock, Roland W. Jeppson, Gary Z. Watters, "Hydraulics of Pipeline systems" CRC Press LLC, 2000.</p> <p>M. Doi and S. F. Edwards "The Theory of Polymer Dynamics" 1994</p> <ul style="list-style-type: none"> Any modern source about the course can be used
B-Electronic references, Internet sites...	
12. The development of the curriculum plan	
<p>1- Work in conformity with the existing curricula in international universities.</p> <p>2- Follow up on scientific developments within the global education sector.</p> <p>3- Scientific communication with the latest scientific developments within the scientific specialization.</p> <p>4- Using the latest versions of specialized software deals with fluid flow like Ansys.</p> <p>5- Going towards the latest publications from international scientific sources.</p>	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Scientific Department / Department of Metallic Materials Engineering
3. Course title/code	Machining of Metals
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester

6. Number of hours tuition (total)	15
7. Date of production/revision of this specification	10/9/2020
8. Aims of the Course	
<p>Introducing the student to the basic principles of machining of metals with its various applications. Where the types of number of pieces are studied along with how their angles are measured. Then studying the types of operation in general and emphasizing the traditional operation and how to measure the cutting forces by mathematical and graphic methods and the effect of these forces on the cutting tool, the cutting machine and the workpiece, in addition to identifying the heat generated during the cutting process, the cutting fluids used and the surface finish after the cutting process</p>	

9. Learning Outcomes, Teaching ,Learning and Assessment Methode

- A- Building integrated projects in terms of interfaces and characteristics and writing equations related to metalworking.
- B- How to choose the appropriate cutting tool for metal cutting.

B. The skills goals special to the course.

Design the appropriate number and measure cutting speed and cutting forces by mathematical and graphic methods

Teaching and Learning Methods

- 1- Using the display screen
- 2- Discussion
- 3- Student groups
- 4- Experiential education
- 5- Interactive education

Assessment methods

- 1- Using the display screen
- 2- Discussion
- 3- In-class effectiveness
- 4- Daily exams
- 5- Semester exams
- 6- Final exam

C. Affective and value goals C1-

Written exams

C2- Semester exams

C3 - Final exams

C4- Daily assessment

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)

D1 Verbal communication (the ability to express thinking clearly and confidently in speech)

D2 Teamwork (working with confidence within the group)

D3 Written communication (the ability to express yourself clearly in writing)

D4 Planning and Organizing (the ability to plan and implement activities effectively)

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	9	Learn how to get the final product and focus on the product that comes out of the operation process	Introduction and classification of the machining process and classification of the number of pieces, the hexagonal shape of the cutting tool and the angles of the cutting tool	Direct lecture to Equilibrium of A Fluid Element Hydrostatic Pressure students	surprise exams
4+5	4	Distinguish between different speeds such as cutting speed, sculpting flow speed, and shear speed, and the relationship between them	Handling of graphs	Direct lecture to students	surprise exams
6-8	6	Learn how to form a sculptor and the types and forms of a sculptor	Dealing with theorems and deriving relationships with many engineering examples	Direct lecture to students	surprise exams
9+10	4	Learn how to measure different cutting forces	Using the Mathematical Method and the Merchant Method	Direct lecture to students	surprise exams
11-13	6	Knowing the emotion	Study of the type of metal cut and the	Direct lecture to students	surprise exams

		during the cutting process and how to form and remove the emerging categorical limit	effect of cutting conditions on it		
14+15	4	Heat in the cutting process and its effect on the workpiece after cutting (product) and how heat is distributed in the cutting process	Study of different minerals in addition to the types of number of pieces used	Direct lecture to students	surprise exams final examination

11. Infrastructure

1. Books Required reading:	
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	1-K.P.Sinha & S.C.Prasad, "Theory of Metal Forming and Metal Cutting"1979. 2-Trent E.M., "Metal Cutting"1984. 3-B.L.Juneja & G.S.Sekhon, "Fundamentals of Metal Cutting and Machine Tools"1987. 4- Sandvik Coromant "Modern Metal Cutting – a practice handbook"1994.
B-Electronic references, Internet sites...	

12. The development of the curriculum plan

- 1- Work in conformity with the existing curricula in international universities.
- 2- Follow up on scientific developments within the global education sector.
- 3- Scientific communication with the latest scientific developments within the scientific specialization.
- 4- Using the latest versions of specialized software deals with fluid flow like Ansys.
- 5- Going towards the latest publications from international scientific sources.

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programmed specification.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Scientific Department / Department of Metallurgical Engineering
3. Course title/code	Corrosion Engineering
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	30
7. Date of production/revision of this specification	12/9/2020
8. Aims of the Course	
Introduce the student to the basic principles of corrosion engineering. Where the concepts and basics of corrosion are studied and the basic theories of corrosion are identified with a touch on the negative and positive aspects of the corrosion as well as the classification of corrosion depending on its causes and appearance with the division of the types of corrosion into pure chemical corrosion, electrochemical corrosion and polarization phenomena and its three types: activation, concentration and mixed. Its importance and determinants, as well as methods for calculating corrosion rates and	

types of corroding cells and also the types of corrosion, which include general uniform corrosion, localized corrosion, which includes intergranular corrosion, stress cracking, galvanic corrosion, erosion corrosion, stress corrosion, pitting corrosion, fissure erosion, scaling corrosion, selective leaching, atmospheric corrosion and biological corrosion with the identification of the methods used in the diagnosis. Flour for the type of corrosion and its reduction

9. Learning Outcomes, Teaching ,Learning and Assessment Method

D- Cognitive goals .

A1- Building integrated projects in terms of interfaces and properties and writing equations related to corrosion engineering and its basics. .

A2 - How to deal with engineering problems related to corrosion engineering and how to address them to reduce corrosion rates

B. The skills goals special to the course.

Design and deal with engineering problems related to corrosion engineering such as macroscopic examination and laboratory tests in order to accurately determine the type of corrosion ,its causes, find effective solutions and treatments to reduce corrosion rates and in proportion to the specialization of students in the Department of Metallurgical Engineering

Teaching and Learning Methods

1- Using the display screen

2- Discussion

3- Student groups

4- Experiential education

5- Interactive education

Assessment methods

1- Using the display screen

2- Discussion

3- In-class effectiveness

4- Daily exams

5- Semester exams

6- Final exam

C. Affective and value goals C1-

Written exams

C2- Semester exams

C3 - Final exams

C4- Daily assessment

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1 Verbal communication (the ability to express thinking clearly and confidently in speech)

D2 Teamwork (working with confidence within the group)

D3 Written communication (the ability to express yourself clearly in writing)

D4 Planning and Organizing (the ability to plan and implement activities effectively)

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	6	Recognition the Principles and the main equations	The concept of corrosion - its damages - its classifications - resistance to corrosion - expression of the rate of corrosion - chemical manifestations of corrosion	Direct lecture to students	surprise exams
4+5	4	Deals with theories and drive relations with many engineering examples	Electrochemical reactions, polarization, passivity	Direct lecture to students	surprise exams
6-8	6	Study the relations and cases studies	Effects of environment variables on corrosion rate	Direct lecture to students	surprise exams
9+10	4	Using industrial and experimental examples	The effect of metallurgical factors on the rate of corrosion	Direct lecture to students	surprise exams
11-13	6	Diagnose the types of corrosion of real examples in industrial structures and determine the type of failure	Corrosion Types	Direct lecture to students	surprise exams
14+15	4	Determine effective design methods in reducing corrosion rates	Corrosion reduction	Direct lecture to students	surprise exams final examination

11. Infrastructure	
1. Books Required reading:	
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	<ol style="list-style-type: none"> 1. Zaki Ahmad, Principles of Corrosion Engineering and Corrosion Control, Butterworth-Heinemann, 1st August 2006. 2. Pedferri, Pietro, Corrosion Science and Engineering, Springer International Publishing, 2018. 3. Dr. Volkan Cicek , Corrosion Engineering, Wiley, April 2014. 4. <u>Sohan L. Chawla</u> and <u>R. K. Gupta</u>, Materials Selection for Corrosion Control, Amazon, 2016
B-Electronic references, Internet sites...	
12. The development of the curriculum plan	
<ol style="list-style-type: none"> 1- Work in conformity with the existing curricula in international universities. 2- Follow up on scientific developments within the global education sector. 3- Scientific communication with the latest scientific developments within the scientific specialization. 4- Using the latest versions of specialized software deals with corrosion engineering. 5- Going towards the latest publications from international scientific sources. 	

نموذج وصف المقرر

مراجعة أداء مؤسسات التعليم العالي ((مراجعة البرنامج الأكاديمي))

وصف المقرر

يوفر وصف المقرر هذا إيجازاً مقتضياً لأهم خصائص المقرر ومخرجات التعلم المتوقعة من الطالب تحقيقها

مبرهنًا عما إذا كان قد حقق الاستفادة القصوى من فرص التعلم المتاحة. ولابد من الربط بينها وبين وصف البرنامج.

١. المؤسسة التعليمية	جامعة بابل
٢. القسم الجامعي / المركز	القسم العلمي / قسم هندسة المعادن
٣. اسم / رمز المقرر	مواد الكترونية ومغناطيسية
٤. البرامج التي يدخل فيها	بكلوريوس
٥. أشكال الحضور المتاحة	أسبوعي
٦. الفصل / السنة	فصلي
٧. عدد الساعات الدراسية (الكلي)	١٥
٨. تاريخ إعداد هذا الوصف	٢٠٢١/١/ ١٥
٩. أهداف المقرر	
<p>تعريف الطالب بالمبادئ الأساسية لمادة مواد الكترونية ومغناطيسية مع تطبيقاتها المختلفة . حيث يتم دراسة أنواع المواد ومعرفة قوانين التوصيل الكهربائي واشباه الموصلات وتطبيقاتها والتعرف على الموصلات الفائقة ثم دراسة المغناطيسية واصل المغناطيسية وقوانينها وأنواع المواد المغناطيسية.</p>	

١٠. مخرجات التعلم وطرائق التعليم والتعلم والتقييم

أ- المعرفة والفهم

- ١أ- التعرف على المواد وعلاقتها بالكترونات واسباب حدوث الكهرباء والمغناطيسية .
- ٢أ- كيفية تصنيع مواد شبه موصله والتمييز بين انواع المواد المغناطيسية .

ب - المهارات الخاصة بالموضوع
كيفية التوصيل الكهربائي واشباه الموصلات وكيف يحدث انهيار العزل الكهربائي واصل المغناطيسية وكيفية حدوثها.

طرائق التعليم والتعلم

- ١ - استخدام شاشة العرض
- ٢ - المناقشة
- ٣ - المجاميع الطلابية
- ٤ - التعليم التجريبي
- ٥ - التعليم التفاعلي

طرائق التقييم

- ١ - استخدام شاشة العرض
- ٢ - المناقشة
- ٣ - الفعالية داخل الصف
- ٤ - الامتحانات اليومية
- ٥ - الامتحانات الفصلية
- ٦ - الامتحان النهائي

ج- مهارات التفكير

- ج ١- الاختبارات التحريرية
- ج ٢- الامتحانات الفصلية
- ج ٣- الامتحانات النهائية
- ج ٤ - التقييم اليومي

د - المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي).

- ١ التواصل اللفظي (القدرة على التعبير عن التفكير بوضوح والثقة بالكلام
- ٢ العمل الجماعي (العمل بثقة ضمن المجموعة)
- ٣ الاتصال الكتابي (القدرة على التعبير عن نفسك بوضوح في الكتابة)
- ٤ التخطيط والتنظيم (القدرة على التخطيط للأنشطة وتنفيذها على نحو فعال)
- ٥ المرونة (التكيف بنجاح مع الأوضاع المتغيرة)

١١. بنية المقرر

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة / المساق أو الموضوع	طريقة التعليم	طريقة التقييم
الأول-الثالث	٦ ساعات	الموصلية الكهربائية واشباه الموصلات وفجوة الطاقة	مقدمه ودراسة القوانين	محاضرة مباشرة على الطلبة	امتحانات مفاجئة
الرابع + الخامس	٤ ساعات	مفهوم مستوى فيرمي والخلية الشمسية وتصنيع المقوم الضوئية	معرفة مستوى فيرمي ودالة فيرمي وكيفية تصنيع المقاومة الضوئية	محاضرة مباشرة على الطلبة	امتحانات مفاجئة
السادس- الثامن	٦ ساعات	الدايود والترستور والمواد العازلة ومبادئ استقطاب العوازل	كيفية تصنيع الدايود والترستور وأنواع المواد العازلة	محاضرة مباشرة على الطلبة	امتحانات مفاجئة وشهرية
التاسع + العاشر	٤ ساعات	انهيار العزل الكهربائي والمواد التوصيل وظاهرة ميزنر	كيفية انهيار العزل الكهربائي وكيف تحدث ظاهرة ميزنر	محاضرة مباشرة على الطلبة	امتحانات مفاجئة
الحادي عشر - الثالث عشر	٦ ساعات	المواد المغناطيسية وأصل المغناطيسية والمواد الفيرومغناطيسية	دراسة المواد المغناطيسية وأنواعها	محاضرة مباشرة على الطلبة	امتحانات مفاجئة
الرابع عشر + الخامس عشر	٤ ساعات	المواد البارامغناطيسية والمواد الفيرومغناطيسية	دراسة المواد البارامغناطيسية والفيرومغناطيسية وخصائصها	محاضرة مباشرة على الطلبة	امتحانات مفاجئة وشهرية

١٢. البنية التحتية

1-Materials science ,structure and characterization of polycrystalline materials ,Vadimir vovilov.2003.
2-Intrent.
3-Phasicalmatallurgy.Robertw. cahn and peter Hassn fourth .Edition .

القراءات المطلوبة :
 ■ النصوص الأساسية
 ■ كتب المقرر
 ■ أخرى

لا يوجد

متطلبات خاصة (وتشمل على سبيل المثال ورش العمل والدوريات والبرمجيات والمواقع الالكترونية)
 الخدمات الاجتماعية (وتشمل على سبيل المثال محاضرات الضيوف والتدريب المهني والدراسات الميدانية)

١٣. خطة تطوير المقرر الدراسي

- ١- عمل مطابقة مع المناهج الموجودة في الجامعات العالمية.
- ٢- متابعة التطورات العلمية الموجودة ضمن قطاع التعليم العالمي.
- ٣- التواصل العلمي مع اخر المستجدات العلمية ضمن الاختصاص العلمي.

١٤. القبول	
المتطلبات السابقة	مركزي
أقل عدد من الطلبة	٣٠
أكبر عدد من الطلبة	٥٠

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Babylon
2. University Department/Centre	Scientific Department / Department of Metallic Materials Engineering
3. Course title/code	Fluid Mechanics
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	30
7. Date of production/revision of this specification	10/9/2020
8. Aims of the Course	

Introducing the student to the basic principles of fluid mechanics with its various applications. Where viscosity and its units are studied and how to measure them. Then study fluids in a state of rest and how they affect different engineering applications in order to study the buoyancy force and factors affecting the stability of floating bodies. Also study and derive the laws of fluid flow with different engineering applications. Then study the basic types of flow, which are stratigraphic and turbulent flow with appropriate engineering examples. The study also includes dimensional analysis with the identification of non-Newtonian fluids because of its great importance in engineering applications. Also, Study the Boundary layer with external and internal flow by deriving its equation for many engineering special cases like flow over flat plate or cylinder sphere and internal flow like flow through pipes with different cross section shapes.

9. Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals .

A1- Building integrated projects related fluid properties like viscosity application 1 and fluid flow behavior in many engineering applications .

A2 - How to deal with engineering problems related with fluid flow and how to design integrated projects to solve such problems.

A3-Study the boundary layer induced by fluid flow (internal and external flow) equation which is the first step to understand the heat transfer.

B. The skills goals special to the course.

Programming and dealing with fluid at rest and fluid flow, learning design procedure to satisfy the most benefit from fluid at rest properties and fluid flow effect to design of many devices that may use in many engineering applications. Where, the target programming in proportion to the specialization of students in the Department of Materials engineering

Teaching and Learning Methods

- 1- Using the display screen
- 2- Discussion
- 3- Student groups
- 4- Experiential education
- 5- Interactive education

Assessment methods

- 1- Using the display screen
- 2- Discussion
- 3- In-class effectiveness
- 4- Daily exams
- 5- Semester exams
- 6- Final exam

- C. Affective and value goals C1-
Written exams
C2- Semester exams
C3 - Final exams
C4- Daily assessment

- D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)
D1 Verbal communication (the ability to express thinking clearly and confidently in speech)
D2 Teamwork (working with confidence within the group)
D3 Written communication (the ability to express yourself clearly in writing)
D4 Planning and Organizing (the ability to plan and implement activities effectively)

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	6	Principles and equations	The Concept of A Fluid (Newtonian And Non-Newtonian Fluid) Viscosity, Units of Viscosity, Dynamic Viscosity, Kinematic Viscosity Viscosity Measurements Equilibrium of A Fluid Element Hydrostatic Pressure	Direct lecture to students Equilibrium of A Fluid Element Hydrostatic Pressure	surprise exams
4+5	4	Deals with theories and drive relations with many engineering	Equations of Motion and Potential Flow Conservation of Mass, Conservation of Momentum,	Direct lecture to students	surprise exams

		examples	Conservation of Energy, Differential Relations for Fluid Motion, Analysis of Rate of Deformation		
6-8	6	Using Many charts and theories related with fluid flow	The Concept of Laminar Fluid Flow The Concept of Turbulent Fluid Flow	Direct lecture to students	surprise exams
9+10	4	Using Moody chart and friction factor equations with tables of pipes connection types	Hydraulics of Pipe Systems, Basic Computations, Fluid Friction, Pipe Design and Pipe Materials	Direct lecture to students	surprise exams
11-13	6	Study the relations and drive the boundary layers equations	Similitude: Dimensional Analysis and Data Correlation And Boundary layer	Direct lecture to students	surprise exams
14+15	4	Theories and procedures	Non-Newtonian Fluids Classification of Non-Newtonian Fluids Apparent Viscosity Constitutive Equations Rheological Property Measurements Fully Developed Laminar Pressure Drops for Non-Newtonian Fluids Fully Developed Turbulent Flow Pressure Drops	Direct lecture to students	surprise exams final examination

11. Infrastructure

1. Books Required reading:	
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	Basic texts * Kreith, F.; Berger, S.A.; et. al. "Fluid Mechanics" <i>Mechanical Engineering Handbook</i> Ed. Frank Kreith Boca Raton: CRC Press LLC,

	1999 Verbeeten, Wilco M.H. "Computational Polymer Melt Rheology" Technische Universiteit Eindhoven, 2001. Ron Darby "Chemical Engineering Fluid Mechanics", second edition, Marcel Dekker, Inc. 2001. Bruce E. Larock, Roland W. Jeppson, Gary Z. Watters, "Hydraulics of Pipeline systems" CRC Press LLC, 2000. M. Doi and S. F. Edwards "The Theory of Polymer Dynamics" 1994 • Any modern source about the course can be used
B-Electronic references, Internet sites...	
12. The development of the curriculum plan	
1- Work in conformity with the existing curricula in international universities. 2- Follow up on scientific developments within the global education sector. 3- Scientific communication with the latest scientific developments within the scientific specialization. 4- Using the latest versions of specialized software deals with fluid flow like Ansys. 5- Going towards the latest publications from international scientific sources.	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

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2. University Department/Centre	Scientific Department / Department of

	Metallic Materials Engineering
3. Course title/code	Fluid Mechanics
4. Modes of Attendance offered	weekly
5. Semester/Year	Semester
6. Number of hours tuition (total)	30
7. Date of production/revision of this specification	10/9/2020
8. Aims of the Course	
<p>Introducing the student to the basic principles of fluid mechanics with its various applications. Where viscosity and its units are studied and how to measure them. Then study fluids in a state of rest and how they affect different engineering applications in order to study the buoyancy force and factors affecting the stability of floating bodies. Also study and derive the laws of fluid flow with different engineering applications. Then study the basic types of flow, which are stratigraphic and turbulent flow with appropriate engineering examples. The study also includes dimensional analysis with the identification of non-Newtonian fluids because of its great importance in engineering applications. Also, Study the Boundary layer with external and internal flow by driving it's equation for many engineering special cases like flow over flat plate or cylinder sphere and internal flow like flow through pipes with different cross section shapes.</p>	

9. Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals .

A1- Building integrated projects related fluid properties like viscosity application 1 and fluid flow behavior in many engineering applications .

A2 - How to deal with engineering problems related with fluid flow and how to design integrated projects to solve such problems.

A3-Study the boundary layer induced by fluid flow (internal and external flow)

equation which is the first step to understand the heat transfer.

B. The skills goals special to the course.

Programming and dealing with fluid at rest and fluid flow, learning design procedure to satisfy the most benefit from fluid at rest properties and fluid flow effect to design of many devices that may use in many engineering applications. Where, the target programming in proportion to the specialization of students in the Department of Materials engineering

Teaching and Learning Methods

- 1- Using the display screen
- 2- Discussion
- 3- Student groups
- 4- Experiential education
- 5- Interactive education

Assessment methods

- 1- Using the display screen
- 2- Discussion
- 3- In-class effectiveness
- 4- Daily exams
- 5- Semester exams
- 6- Final exam

C. Affective and value goals C1-

Written exams

C2- Semester exams

C3 - Final exams

C4- Daily assessment

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)

D1 Verbal communication (the ability to express thinking clearly and confidently in speech)

D2 Teamwork (working with confidence within the group)

D3 Written communication (the ability to express yourself clearly in writing)

D4 Planning and Organizing (the ability to plan and implement activities effectively)

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-3	6	Principles and equations	The Concept of A Fluid (Newtonian And Non-Newtonian Fluid) Viscosity, Units of Viscosity, Dynamic Viscosity, Kinematic Viscosity Viscosity Measurements Equilibrium of A Fluid Element Hydrostatic Pressure	Direct lecture to students Equilibrium of A Fluid Element Hydrostatic Pressure	surprise exams
4+5	4	Deals with theories and drive relations with many engineering examples	Equations of Motion and Potential Flow Conservation of Mass, Conservation of Momentum, Conservation of Energy, Differential Relations for Fluid Motion, Analysis of Rate of Deformation	Direct lecture to students	surprise exams
6-8	6	Using Many charts and theories related with fluid flow	The Concept of Laminar Fluid Flow The Concept of Turbulent Fluid Flow	Direct lecture to students	surprise exams
9+10	4	Using Moody chart and friction factor equations with tables of pipes connection types	Hydraulics of Pipe Systems, Basic Computations, Fluid Friction, Pipe Design and Pipe Materials	Direct lecture to students	surprise exams
11-13	6	Study the relations and drive the boundary layers equations	Similitude: Dimensional Analysis and Data Correlation And Boundary layer	Direct lecture to students	surprise exams
14+15	4	Theories and procedures	Non-Newtonian Fluids Classification of Non-Newtonian Fluids Apparent Viscosity Constitutive Equations Rheological Property Measurements Fully Developed	Direct lecture to students	surprise exams final examination

			Laminar Pressure Drops for Non-Newtonian Fluids Fully Developed Turbulent Flow Pressure Drops		
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11. Infrastructure

1. Books Required reading:	
2. Main references (sources)	
A- Recommended books and references (scientific journals, reports...).	<p>Basic texts</p> <p>* Kreith, F.; Berger, S.A.; et. al. "Fluid Mechanics" <i>Mechanical Engineering Handbook</i> Ed. Frank Kreith Boca Raton: CRC Press LLC, 1999</p> <p>Verbeeten, Wilco M.H. "Computational Polymer Melt Rheology" Technische Universiteit Eindhoven, 2001.</p> <p>Ron darby "Chemical Engineering Fluid Mechanics", second edition, Marcel Dekker, Inc. 2001.</p> <p>Bruce E. Larock, Roland W. Jeppson, Gary Z. Watters, "Hydraulics of Pipeline systems" CRC Press LLC, 2000.</p> <p>M. Doi and S. F. Edwards "The Theory of Polymer Dynamics" 1994</p> <p>• Any modern source about the course can be used</p>
B-Electronic references, Internet sites...	

12. The development of the curriculum plan

- 1- Work in conformity with the existing curricula in international universities.
- 2- Follow up on scientific developments within the global education sector.
- 3- Scientific communication with the latest scientific developments within the scientific specialization.
- 4- Using the latest versions of specialized software deals with fluid flow like Ansys.
- 5- Going towards the latest publications from international scientific sources.

