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 Year 2017-2018

University: Baghdad

College : Engineering

Number Of Departments In The College : 12 Twelve

Date Of Form Completion : April – 3 / 2018

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Dean ’s Name

Date : / 4 / 2018

Signature

Dean ’s Assistant For Scientific Affairs

Date : / / 2018

Signature

The College Quality Assurance And University Performance Manager

Date : / / 2018

Signature

Quality Assurance And University Performance Manager

Date : / / 2018

Signature

**TEMPLATE FOR COURSE SPECIFICATION**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW |

**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. |

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| College of Engineering  University of Baghdad | ***1. Teaching Institution*** |
| Mechanical Engineering Department (MED) | ***2. University Department/Centre*** |
| **Strength of Materials / ME304 / B.Sc. Degree Curriculum / General Mechanics Engineering / Third year.**  This course introduces the description the mechanics of materials of the behavior of solid bodies under load. The way in which they react to applied forces, the deflections resulting and the stresses and strains set up within the bodies, are all considered in an attempt to provide sufficient knowledge to enable any component to be designed such that it will not fail within its service life. The course is designed to provide a background. The course is taught through 5 hrs per week, 3 theories, 1 tutorial, and 1 experimental. | ***3. Course title/code & Description*** |
| Mechanical Engineering ( ME ) Programme | ***4. Programme(s) to which it Contributes*** |
| Annual System ; There is only one mode  of delivery, which is a “Day Program”.  The students are full time students, and on  campus. They attend full day program in  face-to-face mode. The academic year is  composed of 30-week regular subjects. | ***5. Modes of Attendance offered*** |
| 1st & 2nd / Academic Year 2017 – 2018. | ***6. Semester/Year*** |
| 150 hrs. / 5 hrs. per week. | ***7. Number of hours tuition (total)*** |
| April – 16 / 2018. | ***8. Date of production/revision of this specification*** |
| ***9. Aims of the Course*** | |
| 1. Introduce basic definitions and introductory concepts of strength of materials.  2. Introduce the description of simple stress and strain to include a wider coverage of materials, the application of Poisson's ratio effects to two-dimensional stress systems and the expansion of partially constrained bars.  3. Introduce and used the laminations of the simple bending theory as related to the assumptions .  4. Explain and derive the slope and deflection of beams due to temperature effect; finite difference methods for beam deflections.  5. Introduce the power transmitted by shafts; combined stress systems-bending and torsion; bending , torsion and internal pressure. Thin rotating rings and cylinders.  6. Introduce the principles of laminations of spring theories; Wahl and other factors; extension springs-initial tension; allowable stresses.  7. Enable the student to alternative representations of stress at a point; cartesian and polar for uniaxial and biaxial stress conditions.  8. Enable the student to measure the strain distribution at a point – cartesian and polar plots, and revised table for evaluation of strain gauge rosette data.  9. Provide a laminations of failure theories; effect of stress concentrations; safety factors; modes of failure. | |

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| ***10·*** ***Learning Outcomes*** |
| At the end of the class, the student will be able to:  a. Define strength of materials and distinguish between simple stress and complex stresses, and understand and define the basic mechanical and thermal materials properties; especially modulus of elasticity, modulus of rigidity, bulk modulus of elasticity, Poisson's ratio, yield stress, ultimate stress, and coefficient of thermal expansion, and apply laws of strength of materials in elastic region.  b. Calculate; the tensile and compressive stress, shear stress, bending stress, torsion stress, thermal stress, and complex stresses for solid materials under static loads.  c. Understand and apply the principles of dimensional analysis and similitude to strength of materials problems for compound bars.  d. Formulate and solve normal and principal stresses and strains for solid materials under static load, and estimate the yield stress from theories of elastic failure.  e. Analyze boundary conditions over beam types.  f. Estimate slope and deflection over beam types by using double integrals, Macaulay's, and Mohr's methods and using Euler's formula for bars under struts.  g. Calculate shear forces and bending moments over span and cross-sectional area of beams by using diagrams.  h. Calculate hoop, longitudinal, and radial stresses for thin and thick cylinders design.  i. Know how to measure slope and deflections over beam types by using Castiglione's theory from strain energy method.  j. Be able to analyze and design spring types.  k.Be able to apply modern knowledge and to apply mathematics, science, engineering and technology to strength of materials problems and applications.  l. Design and conduct experiments of strength of materials, as well as analyze, interpret data and apply the experimental results for the services.  m. Work in groups and function on multi-disciplinary teams.  n. Identify, formulate and solve engineering strength of materials problems.  o. Understand professional, social and ethical responsibilities.  p. Communicate effectively.  q. Use the techniques, skills, and modern engineering tools necessary for engineering practice in strength of materials applications. |
| ***11.*** ***Teaching and Learning Methods*** |
| 1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Lab. Experiments.  5. Tests and Exams.  6. In-Class Questions and Discussions.  7. Connection between Theory and Application.  8. Field Trips.  9. Extracurricular Activities.  10. Seminars.  11. In- and Out-Class oral conservations.  12. Reports, Presentations, and Posters. |
| ***12. Assessment Methods***  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member ( Instructor ). |
| ***13. Grading Policy***  1. Quizzes:  - There will be a (20 – 25) closed books and notes quizzes during the academic year.  - The quizzes will count 20% of the total course grade.  2. Tests, 2-3 Nos. and will count 10% of the total course grade.  3. Extracurricular Activities, this is optional and will count extra marks ( 1 – 5 % ) for the student, depending on the type of activity.  4. Final Exam:  -The final exam will be comprehensive, closed books and notes, and will take place on January 2018 from 9:00 AM - 12:00 PM in rooms (M12 + M13).  - The final exam will count 70% of the total course grade.  - The final exam will count 70% of the total course grade. |

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| ***14. Course Structure*** | | | | | |
| Assessment Method | Teaching Method | Unit/Module or Topic Title | L Os (Article 10) | Hours | Week |
| 1-4 of article (12) | 1-12 of article (11) | Simple Stress and Strain | a,b,d,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1exp. | 1 |
| 1-4 of article (12) | 1-12 of article (11) | Simple Stress and Strain | a,b,d,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 2 |
| 1-4 of article (12) | 1-12 of article (11) | Compound Bars | c,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 3 |
| 1-4 of article (12) | 1-12 of article (11) | Compound Bars | c,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 4 |
| 1-4 of article (12) | 1-12 of article (11) | Shear Force and Bending Moment Diagrams | b,e,g,k,l,m,n,o,p,q | 5  3 the.  1 tut. | 5 |
| 1-4 of article (12) | 1-12 of article (11) | Shear Force and Bending Moment Diagrams | b,e,g,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 6 |
| 1-4 of article (12) | 1-12 of article (11) | Bending | a,b,c,e,f,g,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 7 |
| 1-4 of article (12) | 1-12 of article (11) | Bending | a,b,c,e,f,g,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 8 |
| 1-4 of article (12) | 1-12 of article (11) | Slope and Deflection of Beams | e,f,i,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 9 |
| 1-4 of article (12) | 1-12 of article (11) | Slope and Deflection of Beams | e,f,i,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 10 |
| 1-4 of article (12) | 1-12 of article (11) | Built – in Beams | e,f,g,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 11 |
| 1-4 of article (12) | 1-12 of article (11) | Built – in Beams | e,f,g,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 12 |
| 1-4 of article (12) | 1-12 of article (11) | Shear Stress Distribution | b,g,k,l,m,n,o,p,q | .5  3 the.  1 tut.  1 exp. | 13 |
| 1-4 of article (12) | 1-12 of article (11) | Shear Stress Distribution | b,g,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 14 |
| 1-4 of article (12) | 1-12 of article (11) | Torsion | b,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 15 |
| 1-4 of article (12) | 1-12 of article (11) | Torsion | b,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 16 |
| 1-4 of article (12) | 1-12 of article (11) | Thin Cylinders and Shells | h,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 17 |
| 1-4 of article (12) | 1-12 of article (11) | Thin Cylinders and Shells | h,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 18 |
| 1-4 of article (12) | 1-12 of article (11) | Thick Cylinders | h,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 19 |
| 1-4 of article (12) | 1-12 of article (11) | Thick Cylinders | h,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 20 |
| 1-4 of article (12) | 1-12 of article (11) | Strain Energy | i,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 21 |
| 1-4 of article (12) | 1-12 of article (11) | Strain Energy | i,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 22 |
| 1-4 of article (12) | 1-12 of article (11) | Springs | j,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 23 |
| 1-4 of article (12) | 1-12 of article (11) | Springs | j,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 24 |
| 1-4 of article (12) | 1-12 of article (11) | Complex Stresses | a,d,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 25 |
| 1-4 of article (12) | 1-12 of article (11) | Complex Stresses | a,d,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 26 |
| 1-4 of article (12) | 1-12 of article (11) | Complex Strain and the Elastic Constants | a,d,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 27 |
| 1-4 of article (12) | 1-12 of article (11) | Complex Strain and the Elastic Constants | a,d,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 28 |
| 1-4 of article (12) | 1-12 of article (11) | Theories of Elastic Failure | a,d,k,l,m,n,o,p,q | 5  3 the.  1 tut.  1 exp. | 29 |
| 1-4 of article (12) | 1-12 of article (11) | Struts | f,k,l,m,n.o.p.q | 5  3 the.  1 tut.  1 exp. | 30 |

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| ***15. Infrastructure*** | | |
| ***Textbook***  "Mechanics of Materials " by E. J. Hearn , 2nd Edition Pergamon Press,1985. Volume(1) and Struts chapter from Volume(2).1985.  ***References***  1. "Strength of Materials" by F. L. Singer and A. Pytel , 3rd Edition, 2008  2. "Strength of Materials" by D. K. Singh , 2nd Edition, 2009.  3." Mechanics of Materials" by J. M. Goodno, 7th Edition, 2009.  ***Others***  1. Notebook prepared by the instructor of the course.  2. Collection of sheets of solved and unsolved problems and Exams questions. | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER | |
| Laboratory experiments in the ( Strength of Materials Lab ) of the Department.  Available websites related to the subject.  Extracurricular activities. | Special requirements (include for example workshops, periodicals, IT software, websites) | |
|  Field and scientific visits.  Extra lectures by foreign guest lecturers | Community-based facilities  (include for example, guest  Lectures , internship , field studies) | |
| ***16. Admissions*** | | |
| ME101, ME102 & ME204 Courses | | Pre-requisites |
| / | | Minimum number of students |
| 37 | | Maximum number of students |
| **Asst. Prof. Dr. Majid Habeeb Faidh-Allah**  Professor of Mechanical Engineering /  Applied Mechanics.  Mech. Engr. Dept.  College of Engineering  University of Baghdad  Tel: +00964 -7901882581  Email: dr\_majidhabeeb@yahoo.com  ***Teaching Assistant:***  **Dr. Thaer Jabbar**  .  . | | ***17. Course Instructors*** |

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