A.S. in Engineering and the Engineering Transfer Program

CourseID	Title	Action
ENGG_110A	Introduction to the Engineering Profession	Revise Course

Expected Outcomes for Student:

Upon completion of this course, students will be able to:
1. Describe the role of engineers in society, and list a number of important historical successes and failures, as well as present challenges, that demonstrate the influence of the engineering profession in shaping modern society. *(F,G)
2. Classify different types of engineers, their typical job functions, the designs they make, and the problems they solve. *(E,F)
3. Describe the academic preparation, continuing education, and ethical responsibilities that are inherent in an engineering career. *(D,G)
4. Develop a personal educational plan, and employ academic and professional success strategies, in order to achieve stated career objectives. *(E,G,H)

*Capital letters after major outcomes indicate how this course contributes to the program-level learning outcomes listed below.

Upon completion of the A.S. Engineering Major or the Engineering Transfer Program, students will be able to:
A. Apply their knowledge of math, science, and engineering to identify, formulate, and solve engineering problems.
B. Design and perform experiments, as well as to analyze and interpret data.
C. Design a system, component, or process to meet desired needs.
D. Demonstrate professional ethical responsibility.
E. Communicate effectively and perform on multi-disciplinary teams.
F. Judge the effects of engineering projects on society and the environment.
G. Engage in life-long learning and explain contemporary issues.
H. Use the techniques, skills, and modern engineering tools necessary for engineering practice.

CourseID	Title	Action
ENGG_111	Computer Tools for Scientists and Engineers: Spreadsheets	New Course

Expected Outcomes for Student:

Upon completion of this course, students will be able to use computer spreadsheet software to perform routine data analysis and numerical problem solving, and to communicate analytical results, according to standard practices in science and engineering.
  Detailed objectives include the following:
  A. Enter and manage data in a spreadsheet program.
  B. Perform calculations on a set of data using user-defined equations and built-in functions.
  C. Perform statistical analyses of data.
  D. Create properly documented plots of data and mathematical functions.
  E. Perform and evaluate linear least-squares regression of data.
  F. Use logarithmic transformations to linearize exponential relationships.
  G. Find roots and extrema of polynomials and other functions using graphical and numerical approaches.
  H. Perform parametric optimization analyses.
  I. Find numerical estimates of local derivatives and definite integrals of functions and data.

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CourseID	Title	Action
ENGG_111DE	Computer Tools for Scientists and Engineers: Spreadsheets	Revise Course
Expected Outcomes for Student:		

Upon completion of this course, students will be able to use computer spreadsheet software to perform routine data analysis and numerical problem solving, and to communicate analytical results, according to standard practices in science and engineering.
  Detailed objectives include the following:
    A. Enter and manage data in a spreadsheet program.
    B. Perform calculations on a set of data using user-defined equations and built-in functions.
    C. Perform statistical analyses of data.
    D. Create properly documented plots of data and mathematical functions.
    E. Perform and evaluate linear least-squares regression of data.
    F. Use logarithmic transformations to linearize exponential relationships.
    G. Find roots and extrema of polynomials and other functions using graphical and numerical approaches.
    H. Perform parametric optimization analyses.
    I. Find numerical estimates of local derivatives and definite integrals of functions and data.

CourseID	Title	Action
ENGG_125	Introductory Engineering Graphics	Revise Course
Expected Outcomes for Student:		

Upon completion of this course, students will be able to...
[1] Generate two- and three-dimensional engineering drawings using manual and computer-aided techniques for an engineering product using standard drawing conventions recognized in the engineering field.
[2] Demonstrate three-dimensional spatial visualization skills by creating isometric, orthographic, and sectional views.
[3] Use the engineering design process to solve engineering problems and develop a product design.
[4] Demonstrate teamwork, technical writing, and oral presentation skills.

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CourseID	Title	Action
ENGG_150	Programming in MATLAB for Engineers	New Course

Expected Outcomes for Student:

Upon completion of this course, students will be able to:

1. Utilize a methodical approach to identify, formulate, and solve computational problems. (A,B,C,H)*
   a. Design algorithms and flowcharts to facilitate programming and problem solutions.
   b. Create, test, and debug computer programs using procedural and object-oriented approaches.
   c. Apply numeric techniques and computer simulations to solve engineering-related computational problems.
   d. Creat and apply MATLAB computer programs to analyze data and to generate tables, charts, and graphs.
2. Communicate analytical approaches and results according to standard engineering practices. (E,H)*
   a. Document reports and assignments in a careful and complete manner so as to effectively communicate the results of the analysis.
   b. Design and document computer programs in a careful and complete manner so as to facilitate analysis and debugging by another programmer, and to anticipate and resolve user errors.

*Capital letters after major outcomes indicate how this course contributes to the program-level learning outcomes listed below.

Upon completion of the A.S. Engineering Major or the Engineering Transfer Program, students will be able to:
   1. apply their knowledge of math, science, and engineering to identify, formulate, and solve engineering problems.
   2. design and perform experiments, as well as to analyze and interpret data.
   3. design a system, component, or process to meet desired needs.
   4. demonstrate professional ethical responsibilty.
   5. communicate effectively and perform on multi-disciplinary teams.
   6. judge the effects of engineering projects on society and the environment.
   7. engage in life-long learning and explain contemporary issues.
   8. use the techniques, skills, and modern engineering tools necessary for engineering pracitice.

A.S. in Engineering and the Engineering Transfer Program

CourseID	Title	Action
ENGG_220	Electric Circuit Analysis	Revise Course

Expected Outcomes for Student:

Upon completion of this course, students will be able to:

1. Utilize standard engineering approaches to model electrical circuits and devices: (A,B,C,E,H)*
  a. Demonstrate an understanding of the i-v characteristics of idealized independent and dependent sources, and basic R, L, and C elements, and appreciate the practical limitations of such models.
  b. Use combinations of ideal basic circuit elements to construct models of practical circuits.
  c. Draw and interpret circuit diagrams, and use standard practices to document analyses and assumptions.
  d. Apply idealized transistor, op amp, and transformer models to the analysis of basic circuit configurations.
2. Utilize a variety of techniques to analyze electric circuit models, evaluate the relative efficacy of each technique for a particular analysis, and use redundant techniques to verify the accuracy of results:(A,H)*
  a. Apply Kirchoff's laws in systematic fashion to formulate circuit equations and solve for desired values of current and voltage in circuits.
  b. Apply equivalence concepts, circuit reduction techniques, and network theorems to simplify the process or generalize the results of circuit analysis.
  c. Perform transient analysis of natural and forced responses of RLC circuits by deriving and solving applicable first and second-order differential equations.
  d. Use complex phasors to represent steady-state sinusoidal (AC) signals and impedances, and extend DC circuit anlysis techniques to the analysis of AC circuits.
  e. Use computer simulation to perform steady and transient analyses of circuits.
3. Apply analytical techniques and results to the practice of engineering design: (A,C,H)*
  a. Optimize circuit parameters to achieve specified design objectives.
  b. Generate circuit designs to perform a specified function.
  c. Use current and/or voltage functions to determine charge, power, and/or energy in circuit elements.
  d. Analyze and optimize power consumption in load circuits connected to DC or AC supplies.

*Capital letters after major outcomes indicate how this course contributes to the program-level learning outcomes listed below.

Upon completion of the A.S. Engineering Major or the Engineering Transfer Program, students will be able to:
 A. apply their knowledge of math, science, and engineering to identify, formulate, and solve engineering problems.
 B. design and perform experiments, as well as to analyze and interpret data.
 C. design a system, component, or process to meet desired needs.
 D. demonstrate professional ethical responsibility.
 E. communicate effectively and perform on multi-disciplinary teams.
 F. judge the effects of engineering projects on society and the environment.
 G. engage in life-long learning and explain contemporary issues.
 H. use the techniques, skills, and modern engineering tools necessary for engineering practice.

A.S. in Engineering and the Engineering Transfer Program

CourseID	Title	Action
ENGG_220L	Electric Circuits Lab	New Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. Operate basic electrical measurement equipment, including oscilloscopes, multimeters, function generators and power supplies. 2. Measure voltage, current, resistance, transient and steady state response. 3. Read circuit schematics and construct simple linear circuits (RC, RL, RLC, Op amps). 4. Use computer simulation tools to model simple linear circuit behavior. 5. Calculate predicted circuit responses. 6. Test circuits, analyze data and compare performance to theory and simulation. 7. Troubleshoot and repair simple electric circuits. 8. Record and document results of lab work using text and graphs. 9. Explain discrepancies between theory and experiment.		

A.S. in Engineering and the Engineering Transfer Program

CourseID	Title	Action
ENGG_235	Engineering Mechanics: Statics	Revise Course

Expected Outcomes for Student:

Upon completion of this course, students will be able to:

1. Utilize standard engineering approaches to model mechanical systems: (A,B,E,H)*
   a. Represent physical systems (actual or illustrated) with reasonable and complete free-body diagrams that are drawn and labeled to professional engineering standards.
   b. Isolate an object from its surroundings (or resolve a component from an assembly) by accurately representing all inter-component reactions.
   c. Accurately represent position, force, and moment quantities using vectors expressed in both geometric and Cartesian unit vector notation.
   d. Formulate and clearly document reasonable assumptions used to simplify analysis

2. Utilize a variety of techniques to analyze rigid-body equilibrium problems, select an appropriate technique for a particular analysis, and evaluate the quality of results: (A,C,H)*
   a. Utilize graphical and trigonometric approaches to analyze simple 2D particle and rigid body equilibrium problems.
   b. Apply Newton's Laws in conjunction with vector mathematical operations to formulate force and moment equilibrium equations in two and three dimensions, and solve them for desired variables using linear algebraic techniques and numerical tools (e.g., scientific calculators, spreadsheets, MATLAB, etc.).
   c. Extend basic rigid-body analysis techniques to systems of rigid bodies, in order to analyze inter-component reactions of trusses, frames, and machines, as well as internal forces in members.
   d. Use integral calculus and composite-body approaches to analyze distributed force systems (including hydrostatic pressure and centroid determination) and to calculate second moments of areas and volumes (i.e., area and mass moments of inertia).
   e. Incorporate consideration of dry friction into rigid body equilibrium analyses.

<mark>*Capital letters after major outcomes indicate how this course contributes to the program-level learning outcomes listed below.</mark>

Upon completion of the A.S. Engineering Major or the Engineering Transfer Program, students will be able to:
  A. apply their knowledge of math, science, and engineering to identify, formulate, and solve engineering problems.
  B. design and perform experiments, as well as to analyze and interpret data.
  C. design a system, component, or process to meet desired needs.
  D. demonstrate professional ethical responsibilty.
  E. communicate effectively and perform on multi-disciplinary teams.
  F. judge the effects of engineering projects on society and the environment.
  G. engage in life-long learning and explain contemporary issues.
  H. use the techniques, skills, and modern engineering tools necessary for engineering practice.

CourseID	Title	Action
ENGG_235DL	Engineering Mechanics: Statics (Distance)	New Course
Expected Outcomes for Student:		

Upon completion of this course, students will be able to:
1. Utilize standard engineering approaches to model mechanical systems: (A,B,E,H)*
  a. Represent physical systems (actual or illustrated) with reasonable and complete free-body diagrams that are drawn and labeled to professional engineering standards.
  b. Isolate an object from its surroundings (or resolve a component from an assembly) by accurately representing all inter-component reactions.
  c. Accurately represent position, force, and moment quantities using vectors expressed in both geometric and Cartesian unit vector notation.
  d. Formulate and clearly document reasonable assumptions used to simplify analysis
2. Utilize a variety of techniques to analyze rigid-body equilibrium problems, select an appropriate technique for a particular analysis, and evaluate the quality of results: (A,C,H)*
  a. Utilize graphical and trigonometric approaches to analyze simple 2D particle and rigid body equilibrium problems.
  b. Apply Newton's Laws in conjunction with vector mathematical operations to formulate force and moment equilibrium equations in two and three dimensions, and solve them for desired variables using linear algebraic techniques and numerical tools (e.g., scientific calculators, spreadsheets, MATLAB, etc.).
  c. Extend basic rigid-body analysis techniques to systems of rigid bodies, in order to analyze inter-component reactions of trusses, frames, and machines, as well as internal forces in members.
  d. Use integral calculus and composite-body approaches to analyze distributed force systems (including hydrostatic pressure and centroid determination) and to calculate second moments of areas and volumes (i.e., area and mass moments of inertia).
  e. Incorporate consideration of dry friction into rigid body equilibrium analyses.

==*Capital letters after major outcomes indicate how this course contributes to the program-level learning outcomes listed below.==

Upon completion of the A.S. Engineering Major or the Engineering Transfer Program, students will be able to:
  A. apply their knowledge of math, science, and engineering to identify, formulate, and solve engineering problems.
  B. design and perform experiments, as well as to analyze and interpret data.
  C. design a system, component, or process to meet desired needs.
  D. demonstrate professional ethical responsibilty.
  E. communicate effectively and perform on multi-disciplinary teams.
  F. judge the effects of engineering projects on society and the environment.
  G. engage in life-long learning and explain contemporary issues.
  H. use the techniques, skills, and modern engineering tools necessary for engineering practice.

CourseID	Title	Action
ENGG_245	Engineering Materials Science	Revise Course
Expected Outcomes for Student:		

Upon completion of this course, students will be able to:

1. Demonstrate the knowledge, skills, and abilities needed to perform basic materials selection and design:
  a. Illustrate the various systems for classifying materials. (A,E)*
  b. Describe and critique the characteristics of common engineering materials, and rank their abilities to meet particular performance requirements. (A,C,F,G)*
  c. Obtain materials properties from standard tables, diagrams, and graphs. (A,C,H)*
  d. Assess the life-cycle societal impacts of materials design choices.(A,C,F,G,H)*

2. Demonstrate the knowledge, skills, and abilities needed to perform basic materials engineering:
  a. Distinguish the relationships between microscopic structures and macroscopic properties of materials, and compare differences between material classes. (A,C)*
  b. Summarize the methods of altering the microstruture of a material by mechanical, thermal, or chemical means to change macroscopic properties. (A,C,H)*
  c. Perform calculations relating to material properties. (A,H)*
  d. Use standard materials testing equipment to measure material properties and evaluate processing treatments, and then write lab reports that analyze and interpret the data. (A,B,C,E,H)*

==*Capital letters after major outcomes indicate how this course contributes to the program-level learning outcomes listed below.==

Upon completion of the A.S. Engineering Major or the Engineering Transfer Program, students will be able to:
  A. apply their knowledge of math, science, and engineering to identify, formulate, and solve engineering problems.
  B. design and perform experiments, as well as to analyze and interpret data.
  C. design a system, component, or process to meet desired needs.
  D. demonstrate professional ethical responsibility.
  E. communicate effectively and perform on multi-disciplinary teams.
  F. judge the effects of engineering projects on society and the environment.
  G. engage in life-long learning and explain contemporary issues.
  H. use the techniques, skills, and modern engineering tools necessary for engineering practice.