



## Program Assessment Report (PAR)

**Industrial + Systems Egr (ISE) Baccalaureate Degree**

**REPORT PREPARED by: Ganapathy, Subhashini**

**ACADEMIC YEAR COVERED BY THIS REPORT: 2020-2021**

### I. PROGRAM LEARNING OUTCOMES

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics 2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors 3. an ability to communicate effectively with a range of audiences 4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts 5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives 6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions 7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

### II. PROCEDURES USED FOR ASSESSMENT

#### A. Direct Assessment

Learning Outcomes 1 of 7 Graduates will be able to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics Method of Assessment ISE 3511 (Fall 2016) ISE 3511 Test One Electronic Concepts (Question 2) Decibels a. Express half power point in terms of dB b. Given the ratio of two power ratings  $P_2 / P_1 = 96$ ; express the power ratio in dB c. Given the ratio of two voltages  $V_2 / V_1 = 36$ ; express the voltage ratio in dB d. Express 1200 milliwatts in dBm ISE 3511 Test Two Direct Current Concepts (Question 7) Equivalent Resistance a. Determine the current through R1 (milliamps) b. Determine the voltage across R1 (Volts) ISE 3511 Test Five Power Supplies (Question 4) Transformers Given an ideal transformer (assume

100% efficiency) with primary turns = 9600 and secondary turns = 1200; and voltage primary = 120 VACRMS with output impedance of  $Z = 8$  ohms. a. Calculate Voltage Secondary b. Calculate Current Secondary c. Determine Input Power d. Determine Input Impedance ISE 3511 Test Seven Alternating Current Concepts (Questions 1 & 2) Resonant Frequency 1. Refer to Figure A - below a. Calculate the circuit impedance for a frequency of 8000 Hz Express your answer as either a complex impedance or as magnitude & angle. 2. Refer to Figure A - above a. Calculate the resonant frequency(in Hz) ISE 2211 (Fall 2017) Final exam question Tungsten-copper (WCu) is an alloy often used in applications requiring high strength, high melting temperature, and good electrical conductivity, such as welding rods. It is believed that there is a relationship between the proportion of tungsten and bending-mode strength. Fifteen welding rods were tested at five different proportions of tungsten in random order and the results presented below

W	Bending-Mode Strength (MPa)
Sample 1	0.70
Sample 2	0.75
Sample 3	0.80
Sample 4	0.85
Sample 5	0.90

770 792 799 882 894 873 922 936 977 1050 1088 1104 1161 1091 1240 Fill in the ANOVA table and state your final conclusion regarding the significance of tungsten content in the bending-mode strength of WCu welding rods. Write a 95% confidence interval on bending-mode strength at the 0.75 tungsten level. Include a unit with your answer. Use Fisher's Least Significant Difference to determine which, if any, pairs of treatment means show significant difference at  $\alpha = 0.05$ . (Hint 12 23 34 45 13 24 35 14 25 15) Source of Variation Sum of Squares Degrees of Freedom Mean Square f0 Treatments Error - Total - - 2 of 7 Graduates will be able to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors Method of assessment ISE 4310 (Fall 2018) Final exam question Question #2 List 5 actions related to lighting to solve eye strain problem for an employee working on an inspection job. ISE 4310 (Fall 2018) Final exam question Question #3 Write 10 recommendations about buying or using hand tools to reduce the risk of cumulative trauma disorders. 3 of 7 Graduates will be able to communicate effectively with a range of audiences Method of assessment ISE 4910 (Fall 2016) Evaluation of oral presentation of project proposal ISE 4920 (Spring 2017) Evaluation of Senior Design final presentation 4 of 7 Graduates will be able to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts Method of Assessment ISE 4400 (Fall 2017) Course project Each team will work together to complete an analysis project. The final result will be a PowerPoint presentation that will be shared with the rest of the class. Projects may be used for future classes as a case study resource. Your calculations/spreadsheets will also be submitted. Obviously you will have to do some research and make some assumptions (please state these in your presentations). Your goal is to be able to make a cash flow diagram for each scenario and then perform an economic analysis (e.g., Present Worth, Annual Worth, Rate of Return, Future Worth, and other topics covered in class) to determine which alternative is preferred. The economic analysis must include sensitivity analysis on the major variable factors used in the analysis. Include depreciation as appropriate along with at least one other supplementary analysis (break-even, benefit-cost, etc.) ISE 4910 (Spring 2018) Assignment This is a group writing assignment; one submission per team is required. Your task is to assess the potential impact of your senior design project under the following four contexts global, economic, environmental, and

societal. Assume that your prototype will transition to the marketplace product and that your team is the “company” who will market and support that product. Describe how each of these influences has affected or may affect your engineering design and product life cycle. Begin your paper with a concise yet thorough project description (~200-400 words). Then address each of the four contexts in a separate, focused subsection of your paper (~750-1000 words each). A set of questions related to each context is provided below to jumpstart your thinking. For full credit, you are encouraged to think beyond these sample questions rather than just answering the given questions. [Assignment handout, which has additional details, has been provided].

5 of 7 Graduates will be able to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Method of Assessment ISE 4910 (Fall 2016) Term paper assignment Define a project that requires a multi-disciplinary team. Decide what disciplines from engineering are required on the team and plan a set of tasks for the team that utilize those disciplines. You can choose a project that might be utilized for senior design, a practical project of interest to you, or a more “fantastic” project that interests you. You should demonstrate your knowledge of other disciplines and how they can contribute to a team. Originality and creative thinking are encouraged and will be rewarded. Submit via MS Word document. No PDF files. Use 12 point, Times New Roman font. Double-spaced with standard margins. Design and include appropriate cover page with all relevant information. References are optional. Cite references (if applicable) in the body of your paper. Minimize quotations. 500-750 words of writing/text. Cover page, reference page and any numbering will not be included in the word count. Submit the paper on time to the appropriate pilot drop box. Late papers will receive a score of no more than 75%. Papers in excess of one week late receive a score of zero.

ISE 4920 (Spring 2017) Advisor evaluation of senior design team project 6 of 7 Graduates will be able to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Method of assessment ISE 4300 (Fall 2017) Quiz problem Bob is testing the effect of noise on task performance. He has designed an experiment where he will present the tasking with a high noise level and low noise level. He has also decided to have a complex task and an easy task at each noise level. He will measure time to complete the task, calculate the average fixation count and error rate. He will have 20 participants and has decided that 10 will do the complex task (with both noise levels) and 10 will do the easy task (with both noise levels). What are the independent variable(s)? What are the dependent variable(s)? What is the factorial design? Between / Within / Mixed (circle one)

ISE 3221 (Spring 2018) Exam question ISE 3221 (Spring 2018) Exam question 7 of 7 Graduates will be able to acquire and apply new knowledge as needed, using appropriate learning strategies

Method of assessment ISE 3211 midterm exam question (Fall 2018) 1- The uniform beam has a mass of 50 kg per meter of length. Compute the reactions at the support O and draw FBD. The force loads shown lie in a vertical plane. (16points) 2- A mechanic pulls on the 13-mm combination wrench with the 140 N force shown. Determine the moment of this force about the bolt center O. Magnitude(N.m) and direction . (4 points) 3- The bridge support structure has a mass of 101.94 kg with center of gravity located midway between A and B. Calculate all the reaction forces and draw FBD if a 3 kN load is applied at the point indicated in the figure. (7 points)“

## **B. Scoring of Student Work**

Scoring of assessment items was done using an answer key for marker questions on tests and using a rubric for more subjective assessment items. Scoring was done by the course instructor or by a student grader supervised by the course instructor. More specific information about assessment of learning outcomes is described in detail in Criterion 4 and appendices of the ABET self-study.

## **C. Indirect Assessment**

Course evaluations and exit interviews are used as indirect assessment measures for the BSISE program. Details of assessment of the BSISE program can be found in the ABET self study

### **III. ASSESSMENT RESULTS/INFORMATION:**

Details of assessment and findings can be found in Criterion 4 of the ABET self-study.

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### **IV. ACTIONS TO IMPROVE STUDENT LEARNING**

Assessment data are shared in program committee meetings, and faculty then discuss what, if any, actions to take to improve results. Student outcomes are assessed on an alternating two year schedule. About half of the outcomes are assessed in one year and the other half in the following year. Analysis and change implementation happens in the opposite year. Details of the assessment and review processes are described in detail in the ABET self-study.

### **V. SUPPORTING DOCUMENTS**

Additional documentation, when provided, is stored in the internal Academic Program Assessment of Student Learning SharePoint site.

