

East Carolina University
Department of Industrial Technology
Study Guide (Syllabus)

ENGR 1020, Integrated Collaborative Engineering II

General Information:

Credit Hours:	(6, 0) 4 hours lecture and 4 hours lab per week.
Catalogue Description:	Integrated Collaborative Engineering II (four hours lecture, four hours laboratory, 6 credits) covers basic engineering concepts in the areas of project analysis and business planning for engineering entrepreneurship and the tools of design analysis involving static forces, stress, shear, torsion and moments. Laboratory activities cover use of spreadsheets to evaluate engineering alternatives and mathematical analytical software plus analysis of engineering materials including tests of stress, fastening methods, and fabrication.
Prerequisites:	ICE 1010
Corequisites:	MATH 2171
Other:	N/A
Program Coordinator:	Dr. Paul Kauffmann

Resource Requirements:

- A. Required Textbooks:
- [Engineering Economy Text](#)
 - Statics and Strength of Materials text

Course Competencies:

Upon completion of this course each student will be able to:

1. Describe the elements of a business plan and the tools to analyze financial health of a technology business including balance sheet and income statements.
2. Apply cost analysis tools to evaluate short term problems in selecting engineering alternatives.
3. Select, apply, and evaluate time value of money tools to analyze capital investments including tax and depreciation implications. Use spreadsheet software to analyze alternatives.
4. Analyze static forces on design elements including friction, moments, shear, and stress.
5. Understand concepts in application of materials and analysis of performance under loads.
6. Use analytical software to solve engineering analysis equations applied to static forces on beams and structures.

Professional Expectations:

In achieving the course competencies, each student is expected to:

- **Be Responsible:** The most important characteristic for a successful engineering career is to take responsibility for your assignments and produce results. Be prepared, complete reading, homework assignments, and projects on or before due dates and appear for and complete all quizzes, tests and the final exam. Don't be a burden on your class mates or your professor.
- **Build Teamwork and collaboration:** Work with your classmates to learn collaboratively and develop the teamwork essential for success in an engineering career.
- **Participate and be an Active Learner:** Be on time, ask questions, and participate positively in each class and lab session.
- **Develop professional work Habits:** Keep work area neat and clean, and use and take proper care of equipment.
- **Be Honest:** Cheating, plagiarism, etc. of any type are not allowed and are grounds for receiving an "F" in the course.
- **Be Prepared and Complete Assignments in a Timely Manner:** Be prepared for your classes and bring needed materials. Assignments must be completed and submitted for grading when they are due.

Computer Applications:

The course covers a range of software essential for success in the engineering curriculum. These include use of an integrated office suite of software with particular emphasis on spreadsheets and plotting capabilities related to engineering problem solution, web pages and file transfer protocols. In addition, students will learn to use MathCAD software to analyze calculus based equations related to analysis of static forces and material characteristics) software to develop engineering drawings.

Laboratory Facilities and Equipment Usage:

This course employs an engineering lab for exercises in materials and processes analysis. In addition, a computer lab is used for development of skills in the use of spreadsheet software to analyze capital equipment investments and develop business plans. Students will perform and receive grades on experiments that support course competencies. Open lab hours will give students maximum opportunity for completing experiments and assignments.

Course Outline:

Topics covered in this course include:

ICE II- Track A	ICE II- Track B
<p>Basic concepts of engineering entrepreneurship</p> <ol style="list-style-type: none"> 1. Business plans 2. Engineering Economy concepts <ol style="list-style-type: none"> a. Basic Cost concepts, Terms and Indirect Cost Allocation b. Time value of money and bond example c. Nominal and Effective Interest Rates and Continuous Compounding d. Equivalent worth methods e. Rate-of-Return Computations for a Single Project f. Rate-of-Return Evaluation for Multiple Alternatives g. Benefit/Cost Ratio Evaluation h. Risk: Breakeven Analysis and Payback Period i. Replacement Analysis j. After-Tax Economic Analysis: Inflation, Depreciation 3. Financial statements and cash flow analysis 	<p>Engineering Fundamentals:</p> <ol style="list-style-type: none"> 1. Introduction to statics. 2. Principles of Statics. 3. Resultants of Coplanar Force Systems. 4. Equilibrium of Coplanar Force Systems. 5. Analysis of Structures. 6. Friction. 7. Centroids, Centers of Gravity, Moments of Inertia. 8. Stresses and Strains. 9. Properties of Materials. 10. Stress Considerations. 11. Torsion in Circular Sections 12. Shear and Bending Moment in Beams.
<p>ICE II- A – Business planning and analysis Lab</p> <ol style="list-style-type: none"> 1. Use Excel to develop financial documents for supporting a business plan. 2. Learn financial functions in Excel to analyze a business case and develop a business plan 	<p>ICE II – B – Materials and Processes Lab</p> <ol style="list-style-type: none"> 1. Study engineering materials and test characteristics related to statics content such as friction, tension, compression. 2. Study fabrication processes and impact on materials characteristics. 3. Introduction to engineering materials 4. Build and test simple structures, trusses, and fastening systems. 5. Integration of Math CAD software applied to solution of equations involved in statics and mathematical course content. 6. Develop lab reporting skills

Student Assessment:

Students will be evaluated based on the combination of class activities. The final grade will be assessed with the following criteria:

Grading		Assessment	
A	90% or better	Quizzes	10 %
B	80% or better	Exams	40 %
C	70% or better	Lab assignments	35 %
D	60% or better	Projects	15 %
F	Less than 60%	Total	100%

Assignments must be completed and submitted for grading when they are due.

ATTENDANCE: Required

DISABILITY POLICY: East Carolina University seeks to fully comply with the Americans with Disabilities Act (ADA). Students requesting accommodations based on a covered disability must go to the Department for Disability Support Services, located in Brewster A-114, to verify the disability before any accommodations can occur. The telephone number 252-328-6799.