

Engineering Economy

ENGI-220

CG Section 8WK 07/01/2018 to 12/31/2199 Modified 04/07/2022

Course Description

Introduction to the principles of time value of money, analysis of investments, break-even concepts, risk analysis, alternatives analysis, tax implications, certainty and uncertainty.

Requisites

For information regarding prerequisites for this course, please refer to the [Academic Course Catalog](https://catalog.liberty.edu/) (<https://catalog.liberty.edu/>).

Rationale

The engineering degree programs are designed to develop Christ-centered men and women with the values, knowledge, and skills essential to positively influence engineering-related industries in the current and evolving economy. The programs prepare graduates for the thoughtful integration of work and life and to view the engineering profession as a lifelong commitment to serving others. Within a few years of graduating, engineering graduates will be able to advance in an engineering career or graduate studies, be recognized as creative thinkers exhibiting an aptitude for continuous learning, and display professional ethics and behavior consistent with foundational Christian principles.

This course introduces the engineering student to the analysis of the economic aspects of a vast number of problems both in the business world, as well as one's personal life. The student learns and applies the techniques to solve problems and the decision-making process within an economic context and economic constraints.

Course Learning Outcomes

Course Learning Outcomes

The student will be able to:

1. Understand and apply fundamental concepts and use the terminology of engineering economics. (SO: 1, 3, 7)
2. Derive and use the engineering economy factors to account for the time value of money. (SO: 1, 7)
3. Use multiple factors and spreadsheet functions to find equivalent amounts for cash flows that have nonstandard placement. (SO: 1)
4. Make computations for interest rates and cash flows that are on a time basis other than a year. (SO: 1)
5. Utilize different techniques (present worth, annual worth, future worth, rate of return, benefit/cost) to evaluate and select alternatives and communicate the results. (SO: 1, 3)
6. Perform a replacement/retention study between an in-place asset, process, or system and one that could replace it and communicate the results. (SO: 1, 3)
7. Select independent projects for funding when there is a limitation on the amount of capital available for investment and communicate the results. (SO: 1, 3)
8. Determine the breakeven for one or two alternatives and calculate the payback period with and without a return required and communicate the results. (SO: 1, 3)
9. Expound and contrast the Biblical versus societal views of money (SO: 3, 4)

Relation to Student Outcomes

SO	Outcome Description	Level	Demonstrate Proficiency
1	Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	E	Mid-Term & Final Quiz, Reading Assessment Quiz, Problem Sets
2	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	N	
3	Ability to communicate effectively with a range of audiences	R	Mid-Term & Final Quiz, Papers & Presentations, Discussions
4	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	I	Papers & Presentations
5	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	N	
6	Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	N	
7	Ability to acquire and apply new knowledge as needed, using appropriate learning strategies	I	Reading Assessment Quiz, Problem Sets, Discussions
N = none; I = Introduced; R = Reinforced; E = Emphasized			

Course Resources

Click on the following link to view the required resource(s) for the term in which you are registered: [Liberty University Online Bookstore \(https://bncvirtual.com/liberty\)](https://bncvirtual.com/liberty)

Additional Materials for Learning

- Computer with basic audio/video output equipment
- Internet access (broadband recommended)
- Canvas [recommended browsers \(https://community.canvaslms.com/t5/Canvas-Basics-Guide/What-are-the-browser-and-computer-requirements-for-Canvas/ta-p/66\)](https://community.canvaslms.com/t5/Canvas-Basics-Guide/What-are-the-browser-and-computer-requirements-for-Canvas/ta-p/66)
- Microsoft Excel

Course Assignments

Textbook Readings and Lecture Presentations

Course Requirements Checklist

After reading the Course Syllabus and Student Expectations, the student will complete the related checklist found in the Course Overview.

Discussions (6)

Discussions use the SEEI method to discuss economic topics. The SEEI is a method of clarification and understanding. It stands for State, Elaborate, Exemplify, and Illustrate. The student is required to create a thread in response to the provided prompt for each forum. Each thread must be at least 250 words, providing citations as appropriate. In addition to the thread, the student is required to reply to the threads of at least 2 classmates. Each reply must be at least 125 words. (LO 3, 7)

Mid-Term and Comprehensive Final Quiz

There will be one mid-term quiz during the term as well as a comprehensive final quiz. The purpose of quizzes is to reinforce the learning process and validate the student's comprehension and retention of the material covered. Solutions are expected for all problems. An 'answer' is the final numerical value corresponding to the question asked in the problem. By contrast, a 'solution' is more in that it also includes the argument/reasoning/ work that leads to the answer. Quizzes may be administered online in McGraw Hill Connect. (LO: 1, 3)

Papers and Presentation Assignments

There will be two papers required for this course, a shorter paper dealing with financial wisdom and a longer paper requiring research of an engineering economy topic on a contemporary issue. The research paper findings and conclusions will be submitted in report format and also presented orally. (LO: 3, 4)

Quiz: Reading Assessments

There are 14 Reading Assessment quizzes. A Reading Assessment (RA) measures the student's preparation for engaging new course material. Reading assessments are completed in the McGraw Hill Connect platform and have an unlimited number of trials to answer the questions correctly prior to the due date. The RAs use the Connect SmartBook interactive study tool that adaptively assesses students' skill and knowledge levels to track which topics students have mastered and which require further instruction and practice. Based on student progress, it then adjusts the learning content based on their knowledge strengths and weaknesses, as well as their confidence level around that knowledge. (LO: 1, 7)

Problem Set Assignments

There will be 14 graded problem set assignments for the sections of the assigned text covered. The purpose of the assignments is to reinforce material covered during the reading and study class activities. (LO: 1, 7)

✓ Course Grading

Mid-Term & Final Quiz	250
Quiz: Reading Assessments	140
Problem Sets Assignments	340
Discussions	120
Financial Wisdom Paper Assignment	50

Contemporary Issue Paper & Presentation Assignment	100
Course Requirements Checklist	10
Total	1010

Policies

Late Assignment Policy

Course Assignments, including discussions, exams, and other graded assignments, should be submitted on time.

If the student is unable to complete an assignment on time, then he or she must contact the instructor immediately by email.

Assignments that are submitted after the due date without prior approval from the instructor will receive the following deductions:

1. Late assignments submitted within one week after the due date will receive up to a 10% deduction.
2. Assignments submitted more than one week and less than 2 weeks late will receive up to a 20% deduction.
3. Assignments submitted two weeks late or after the final date of the course will not be accepted outside of special circumstances (e.g. death in the family, significant personal health issues), which will be reviewed on a case-by-case basis by the instructor.
4. Group projects, including group discussion threads and/or replies, and assignments will not be accepted after the due date outside of special circumstances (e.g. death in the family, significant personal health issues), which will be reviewed on a case-by-case basis by the instructor.

Disability Assistance

Students with a disability and those with medical conditions associated with pregnancy may contact Liberty University's Online Office of Disability Accommodation Support (ODAS) at LUOODAS@liberty.edu for accommodations. Such accommodations require appropriate documentation of your condition. For more information about ODAS and the accommodations process, including how to request an accommodation, please visit <https://www.liberty.edu/online/online-disability-accommodation-support/> (<https://www.liberty.edu/online/online-disability-accommodation-support/>). Requests for accommodations not related to disabilities or pregnancy must be directed to the Registrar's Office, which generally handles medical needs support.

If you have a complaint related to disability discrimination or an accommodation that was not provided, you may contact ODAS or the Office of Equity and Compliance by phone at (434) 592-4999 or by email at equityandcompliance@liberty.edu. Click to see a full copy of Liberty's [Discrimination, Harassment, and Sexual Misconduct Policy](https://www.liberty.edu/media/1226/Liberty_University_Discrimination_Harassment_and_Sexual_Misconduct_Policy.pdf) (https://www.liberty.edu/media/1226/Liberty_University_Discrimination_Harassment_and_Sexual_Misconduct_Policy.pdf) or the [Student Disability Grievance Policy and Procedures](http://www.liberty.edu/media/8021/Disability_Grievance_Procedures.pdf) (http://www.liberty.edu/media/8021/Disability_Grievance_Procedures.pdf).

Course Attendance

In an effort to comply with U.S. Department of Education policies, attendance is measured by physical class attendance or any submission of a required assignment within the enrollment dates of the course (such as examinations, written papers or projects, any discussion posts, etc.) or initiating any communication with one's professor regarding an academic subject. More information regarding the [attendance policy](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwiki.os.liberty.edu%2Fdisplay%2FIE%2FOnline%2BAttendance%2BAnd%2BNon-Attendance&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613719138&sdata=%2BNBTsPOoXuHAPLfISQRugK7cRSuV6UyC7qD3agf3l2k%3D&reserved=0) (<https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwiki.os.liberty.edu%2Fdisplay%2FIE%2FOnline%2BAttendance%2BAnd%2BNon-Attendance&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613719138&sdata=%2BNBTsPOoXuHAPLfISQRugK7cRSuV6UyC7qD3agf3l2k%3D&reserved=0>) can be found in the [Academic Course Catalogs](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.liberty.edu%2Findex.cfm%3FPID%3D791&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613729132&sdata=DjjhMiRBFnF%2B2ZJUC8eBd1OdNb26S9ADukODYsilXIA%3D&reserved=0) (<https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.liberty.edu%2Findex.cfm%3FPID%3D791&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613729132&sdata=DjjhMiRBFnF%2B2ZJUC8eBd1OdNb26S9ADukODYsilXIA%3D&reserved=0>). Regular attendance in online courses is expected throughout the

length of the term. Students who do not attend within the first week of a sub-term by submitting a required academic assignment (such as the Course Requirements Checklist, an examination, written paper or project, discussion post, or other academic activity) will be dropped from the course. Students who wish to re-engage in the course are encouraged to contact Academic Advising to discuss their enrollment options. Students who begin an online course, but at some point in the semester cease attending, and do not provide official notification to withdraw, will be assigned a grade of "FN" (<https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwiki.os.liberty.edu%2Fdisplay%2FIE%2FUnofficial%2BWithdrawals&data=02%7C01%7Caccollins2%40liberty.edu%7Cd91431fa6ac547056b5408d833029e1a%7Cbaf8218eb3024465a9934a39c97251b2%7C0%7C0%7C637315433613729132&sdata=MoMvZdPfa69InuhVHMHAVgu59ZP0Fw45xJTU9PIBrU%3D&reserved=0>). Students wishing to withdraw from courses after the official start date should familiarize themselves with the [withdrawal policy](#).

Grading Scale

A	B	C	D	F
900-1010	800-899	700-799	600-699	0-599

For courses with a Pass/NP final grade, please refer to the Course Grading section of this syllabus for the assignment requirements and/or point value required to earn a Passing final grade.

Add/Drop Policy

The full policy statement and procedures are published in the [Policy Directory \(https://wiki.os.liberty.edu/display/IE/Dropping+and+Adding+Online+Classes\)](https://wiki.os.liberty.edu/display/IE/Dropping+and+Adding+Online+Classes).

Honor Code

Liberty University comprises a network of students, Alumni, faculty, staff and supporters that together form a Christian community based upon the truth of the Bible. This truth defines our foundational principles, from our Doctrinal Statement to the Code of Honor. These principles irrevocably align Liberty University's operational procedures with the long tradition of university culture, which remains distinctively Christian, designed to preserve and advance truth. Our desire is to create a safe, comfortable environment within our community of learning, and we extend our academic and spiritual resources to all of our students with the goal of fostering academic maturity, spiritual growth and character development.

Communities are predicated on shared values and goals. The Code of Honor, an expression of the values from which our Doctrinal Statement was born, defines the fundamental principles by which our community exists. At the core of this code lie two essential concepts: a belief in the significance of all individuals, and a reliance on the existence of objective truth.

While we acknowledge that some may disagree with various elements of the Code of Honor, we maintain the expectation that our students will commit to respect and uphold the Code while enrolled at Liberty University.

Adherence to the principles and concepts established within facilitates the success of our students and strengthens the Liberty community.

The Code of Honor can be viewed in its entirety at <http://www.liberty.edu/index.cfm?PID=19155> (<http://www.liberty.edu/index.cfm?PID=19155>).

Schedule

When	Topic	Notes
Course Overview	Student Acknowledgements	Course Requirements Checklist
	Technology Integration Set-Up	Prepare: Register for Connect

When	Topic	Notes
Module 1: Week 1	Learn	Read & Interact: 2 items Read: 16 items Watch: 2 items
	Apply	Problem Set: Time Value of Money Assignment Problem Set: Foundations of Engineering Economy Assignment
Module 2: Week 2	Learn	Read & Interact: 2 items Read: 7 items Watch: 2 items
	Apply	Discussion: Time Value of Money Financial Wisdom Assignment Problem Set: Nominal & Effective Interest Rates Assignment Problem Set: Combining Factors & Excel Functions Assignment
Module 3: Week 3	Learn	Read & Interact: 2 items Read: 7 items Watch: 2 items
	Apply	Discussion: Nominal & Effective Interest Rates Problem Set: Present Worth Analysis Assignment Problem Set: Annual Worth Analysis Assignment
Module 4: Week 4	Learn	Read & Interact: 2 items Read: 13 items Watch: 2 items
	Apply	Discussion: Present & Annual Worth Analysis Problem Set: Rate of Return: Multiple Projects Assignment Problem Set: Rate of Return: Single Project Assignment Quiz: Mid-Term
Module 5: Week 5	Learn	Read & Interact: 2 items Read: 11 items Watch: 2 items
	Apply	Discussion: Rate of Return Problem Set: Benefit/Cost Analysis Assignment Problem Set: Replacement & Retention Assignment

When	Topic	Notes
Module 6: Week 6	Learn	Read & Interact: 2 items Read: 4 items Watch: 2 items
	Apply	Discussion: Benefit/Cost Analysis Problem Set: Independent Projects with Budget Limitations Assignment Problem Set: Break Even & Payback Analysis Assignment
Module 7: Week 7	Learn	Read & Interact: 2 items Read: 6 items Watch: 1 item
	Apply	Discussion: Payback Period Problem Set: Sensitivity Analysis Assignment Problem Set: Decision Making Under Risk Assignment
Module 8: Week 8	Learn	Read: 2 items Watch: 1 item
	Apply	Contemporary Issue Paper and Presentation Assignment Quiz: Comprehensive Final