



monarch

Curriculum Catalog

Career and Technical Education Series

Engineering and Product Development

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Engineering and Product Development Course Overview

Engineers address society's needs and problems by designing and producing products and services. The field is diverse and includes Christian professionals who design skyscrapers, design machinery, oversee public works, and develop software and systems.

The purpose of this course is to provide an overview of the concepts of product engineering and development from a Christ-centered perspective. Students will analyze the life cycle of a product to prepare it for distribution and target markets. The course begins with building an understanding of the product life cycle, from the initial idea to drafting requirements to using 3-D modeling tools and other design tools. The final unit focuses on assembling project plan pieces for a product and evaluating the plans for a successful product launch. In addition, the course will provide information about the different careers available to students interested in engineering, product development, and project management, as well as, organizations that provide encouragement to Christian engineers.

Objectives

- Understand the field of engineering design and product development, as well as economic and project management concepts.
- Recognize the complex variables that need to be planned and coordinated as part of the product development life cycle.
- Develop ideas for overcoming challenges and issues related to engineering and product development and identify different career paths related to engineering and project management.
- Analyze product development life cycle management and discuss the role of data and human resources.
- Identify best practices for project management in engineering and strategies for building successful projects that utilize communication and critical thinking skills required for addressing complex problems.
- Evaluate and critique multiple perspectives and multiple vested interests involved in engineering project management and product development.

For topics in this course, it is helpful for students to be familiar with general concepts about engineering, as well as the basics of accessing IT tools and resources for conducting research on web sites.

If students are not familiar with these topics, it is important for them to familiarize themselves with online resources for engineering and product development.

Unit 1: Introduction to Engineering and Product Development	
Assignments	
Engineering and Product Development	1. Course Overview
	2. Introduction to Engineering
	3. Fundamentals of Product Development
	4. Project: Analyze Product Engineering
	5. Identifying and Testing Product Concepts
	6. Project: Product Development Process
	7. Quiz 1: Engineering and Product Concepts
	8. Requirements in Engineering, Design and Developing a Prototype
	9. Project: Write Engineering Requirements for Your Product
	10. Testing the Product
	11. Deploying Products to Market
	12. Project: Software Deployment Plan
	13. Quiz 2: Specifications, Design and Testing Products
	14. Special Project*
	15. Test
	16. Course Project Part 1: Research Smart Grids*
	17. Glossary and Credits

Engineering and Product Development	Unit 2: Project Charter and Requirements (PDLC Phases)	
	Assignments	
	1. What is a Project Charter?	9. Project: Competing with the Best
	2. Writing Project Charters and Understanding Requirements	10. Writing Product Requirements
	3. Project: Write a Project Charter	11. Project: Reverse Engineering
	4. Analyzing Project Charters	12. Quiz 2: Establishing Requirements
	5. Project: Write a Charter for a Recycling Project	13. Special Project*
	6. Quiz 1: The Components of Project Charters	14. Test
	7. What Are Requirements?	15. Course Project Part 2: Summarizing Case Studies of Selected Smart Grid Technology*
	8. Defining and Writing Requirements	16. Glossary and Credits

Engineering and Product Development	Unit 3: Design and 3-D Modeling	
	Assignments	
	1. Design Engineering	9. Project: Design a Part in 3-D
	2. Project: Student Engineer Needed: Houseplant Watering System	10. Evaluate Engineering Tools and Careers
	3. Analyze Problems and Potential Solutions in Design Engineering	11. Project: Evaluate 3-D Modeling Tools
	4. Analyze Design Plans	12. Quiz 2: Becoming Familiar with Design Tools
	5. Project: Design a Running Shoe	13. Special Project*
	6. Quiz 1: Exploring the Possibilities in Design	14. Test
	7. Engineering Modeling Tools	15. Course Project Part 3: Developing Components for the Final Project Plan*
	8. Practice Using Engineering Modeling Tools	16. Glossary and Credits

Engineering and Product Development	Unit 4: Product Launch (Implementation)	
	Assignments	
	1. The Implementation Stage	9. Project: Timeline, Market, Budget
	2. Analyze an Implementation Plan	10. Marketing, Engineering, and Implementation
	3. Project: Write an Implementation Plan	11. Project: Reverse Engineer a Marketing Plan
	4. PLM, Implementation, and Industry Concepts	12. Quiz 2: Getting the Product Ready for the Market
	5. Project: Prepare a Presentation about Engineering Contests	13. Special Project*
	6. Quiz 1: Putting Implementation into Action	14. Test
	7. Implementation Plan and Product Launch	15. Course Project Part 4: Designing and Modeling the Smart Grid*
	8. Implementation Plan and Product Life Cycle	16. Glossary and Credits

Unit 5: Review Full Product Development Life Cycle		
Engineering and Product Development	Assignments	
	1. Reviewing the Product Development Life Cycle and Key Strategies	9. Project: Develop a 3-D Video Game Project Plan and Sample Game
	2. Project: Write a Project Plan	10. How to Evaluate Project Plans
	3. Assembling a Successful Project Plan	11. Project: Write a Project Brief and Evaluate It
	4. Planning, Structure, and Thinking Behind Project Plans	12. Quiz 2: Perfecting Your Project Plan
	5. Project: Write Part of a Project Plan Chart	13. Special Project*
	6. Quiz 1: Putting Together the Pieces of the Plan	14. Test
	7. Compare and Contrast Project Plans	15. Course Project Part 5: Implementation Plan*
	8. Assembling Project Plans and Engineering for the Twenty-First Century	16. Glossary and Credits
Unit 6: Course Project, Review, and Exam		
E&PD	Assignments	
	1. Course Project Part 6: Finalize Your Proposal*	3. Exam
	2. Course Review	

(*) Indicates alternative assignment