The Gordon College 3-2 Engineering Program

"See, the Lord has called Bezalel the son of Uri . . . and filled him with the Spirit of God, in wisdom, understanding and knowledge and in all craftsmanship to make designs . . . to perform every inventive work . . . Then Moses called Bezalel and Oholiab and every person in whom the Lord had put skill, everyone whose heart stirred him . . . in the building of the sanctuary ."
—Exodus 35 and 36

"There is not a square inch in the whole domain of human existence over which Christ, Sovereign over all, does not cry, 'Mine!'."
— Abraham Kuyper, theologian and Prime Minister of the Netherlands (1901– 1905)

Executive Summary

The engineering and applied science fields are attractive career options for many students and Gordon offers a pre-engineering track as an entrée to these professions. Ours is a 3-2 program: students attend Gordon for the first three years before transferring to an engineering institution for the final two years. Upon completion of the full program, students receive a B.S. in physics from Gordon College and a B.S.E. from the engineering school. This program combines the best aspects of the Christian liberal arts tradition with focused engineering instruction.

The Call of an Engineer

If we accept Kuyper's grand view of redemption, we must help all of our students internalize this view. In particular, we need to teach students interested in physics or engineering to grapple with questions such as:

- How can we prepare ourselves to do important work in science or technology in light of God's redemptive purposes for creation?
- How does a Christian worldview inform, synergize or clash with their calling?
- The standards which govern the engineering profession are strictly utilitarian. But how does our relationship with God serve as an origin from which to define the proper direction and context for understanding the profession and its norms (as well as for the personal norms of the working Christian)?

Such questions are of great importance and are not addressed in a traditional undergraduate curriculum in either the sciences or engineering. Gordon's position as an unabashedly Christian liberal arts college offers a strategic position from which to encourage students called to these professions. We have an obligation to mentor future engineers from the viewpoint that God has total ownership of creation. We must reinforce the understanding that our knowledge and achievements are outworkings of His redemptive love toward creation. Students grounded in this way at Gordon can then proceed to an engineering school, graduate school, the workforce, or wherever God leads, and impact the lives of those around them.

A small, Christian liberal arts college setting is the optimal framework from which to prepare the 21st century engineer. Advanced professional instruction will come after leaving Gordon and our students must be prepared to receive and excel in this instruction. Yet while they are here on our campus, we must help them put into perspective their future engineering education and the worldviews they will encounter at both secular institutions and in the workplace. This happens through our mentoring, intentional injection of such considerations into our courses, the Core Curriculum, and immersion in the Christ-centered Gordon community.

As we help our students mature and follow God's call in their lives, we must not compromise on their discipline-specific preparation. If their calling is in engineering, we must equip them to excel as engineers. In Exodus 35 and 36, God called upon mankind's engineering capabilities in the construction and design of the tabernacle. Our God-granted abilities to design and create, to understand the natural world, to tame it, and to harness and unleash constructive and destructive forces are powerful indeed. We must therefore prepare our students to be competent, inventive and responsible.

The breadth of exposure, the communication skills and interdisciplinary thought, the forging of Christian character, thought and action here at Gordon, and the subsequent learning and practice available at a quality engineering institution, result in a uniquely prepared person—one who is grounded in faith and understands the pursuit of engineering as a calling from God. Our students are prepared to tackle not just the technical challenges of this century, but the greater, moral challenges as well.

Most undergraduate engineering programs expect students to have a common set of skills by their junior year of engineering instruction. Our program teaches those skills in an uncompromising manner, always with an eye toward expanding the understanding that all aspects of one's life as an engineer must ultimately be viewed in relation to one's membership in the Kingdom of God.

It is our belief that we are preparing more than just 21st century liberal-arts-educated Christian engineers here at Gordon (quite a concept in and of itself). We are preparing missionaries for the engineering mission field.

Details of the Program

3-2 engineering students at Gordon complete our "core curriculum" during their time here. Although we tailor specific course selection to each student's interests, a generic template for their coursework includes the following:

Generic Template for the Gordon 3-2 Program

Core Curriculum	Math and Science	Pre-engineering
(As listed in catalog)	MAT 141/142/223/225	PHY 125*
	PHY 121*/122*/214/225*/314*	PHY 216*
	CHE 111* & CPS 121*	PHY 328*

- Courses with an asterisk have a lab component.
- Physics and pre-engineering courses include extensive use of MATLAB and LabVIEW.
- A feature unique to our program is that all three pre-engineering courses are lab courses.

Gordon College may be the only liberal arts college (without an engineering major) that has a laboratory dedicated to the preparation of its engineering students.

Many liberal arts colleges offer freshman-level PHY 125 (Intro to Engineering), but it is often taught without labs. A few other schools offer a 2nd year PHY 216 (Statics), but once again, it usually lacks the lab component. PHY 328 (Strength of Materials) is a unique feature of our program—this is a junior-level lab course even at many engineering schools! The goal, simply put, is to have our 3-2 students *better* prepared as transfer students than their peers who began at the engineering institution.

The new engineering lab in the Ken Olsen Science Center was designed with the flexibility and capabilities required for engineering instruction needs—it is not a converted physics lab or a re-purposed classroom. This lab was realized through the generosity of donors who share the belief that servant leaders for this increasingly technological world are best prepared from a basis in the Christian liberal arts tradition. Gordon's engineering lab is state-of-the art in equipment, instructional methods and practices.

We have an articulation agreement with the Viterbi School of Engineering at the University of Southern California (USC) regarding the transfer of students from Gordon to USC. This agreement defines transfer credits in both directions to ensure students complete both degrees within the five-year time frame. **However, our students are welcome and encouraged to transfer to any accredited engineering school**—I have had students transfer to USC, Cornell, Virginia Tech, Colorado School of Mines, UC San Diego, Worcester Polytechnic Institute, and others. Our program prepares them for the rigors of even the most demanding engineering curricula.

Gordon College 3-2 Engineering Program Schematic

3 years at Gordon—liberal arts core, math and science, pre-engineering courses

Credit transferred forward to complete G.E. and lower division coursework

Credit transferred back to complete upper division coursework

2 years at engineering school—upper division engineering courses

A student transfers after three years, taking credits from Gordon to fulfill general education and lower division requirements for the engineering school. After two years of study there, the student transfers back upper division credits to complete Gordon's engineering-physics concentration. The student graduates twice that May—once to receive an engineering degree and once to receive a Gordon degree in physics. We feel strongly about the awarding of a Gordon degree to complement the technical skills and training done at the engineering school. The Gordon degree speaks to consideration of larger questions, refined communication skills, an interdisciplinary approach to problem solving and most of all, a person whose life will be a reflection of God's grace in a world crying out for redemption.

"Then the cloud covered the tent of meeting,
and the glory of the Lord filled the tabernacle." *—Exodus 40:34*

Please contact us with any further questions or thoughts. God's blessings to you as you pray about your academic future!