

# ENGINEERING FUNDAMENTALS (ENGR)

Subject-area course lists indicate courses currently active for offering at the University of Louisville. Not all courses are scheduled in any given academic term. For class offerings in a specific semester, refer to the Schedule of Classes ([https://csprd.louisville.edu/psp/ps\\_class/EMPLOYEE/PSFT\\_CS/c/COMMUNITY\\_ACCESS.CLASS\\_SEARCH./x/?state=62dab551a0d600a5e8237359c50704e59007&duo\\_code=sjUx20STj215WVEUG3219HjDmfxp0v](https://csprd.louisville.edu/psp/ps_class/EMPLOYEE/PSFT_CS/c/COMMUNITY_ACCESS.CLASS_SEARCH./x/?state=62dab551a0d600a5e8237359c50704e59007&duo_code=sjUx20STj215WVEUG3219HjDmfxp0v)).

500-level courses generally are included in both the undergraduate- and graduate-level course listings; however, specific course/section offerings may vary between semesters. Students are responsible for ensuring that they enroll in courses that are applicable to their particular academic programs.

## Course Fees

Some courses may carry fees beyond the standard tuition costs to cover additional support or materials. Program-, subject- and course-specific fee information can be found on the Office of the Bursar website (<https://louisville.edu/bursar/tuitionfee/university-fees/>).

### ENGR 75. Student Success Seminar 0 Units

**Term Typically Offered:** Fall, Spring

**Prerequisite(s):** Instructor permission Your co-curricular program has been designed to foster retention through engagement of the cohort in program offerings encouraging community building, diversity, and academic & personal success.

**Description:** In this seminar, you'll be supported in achieving five key outcomes spread across three themes (Self Awareness and Self-Efficacy, Academic Success, and Community Engagement). Everything you do in this course will connect to one or more of these learning outcomes, which are interwoven throughout each session to help you on your journey at UofL.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### ENGR 100. Differential Calculus for Engineering - QR 4 Units

**Term Typically Offered:** Fall Only

**Prerequisite(s):** ENGR 181, appropriate math placement score, or completion of appropriate coursework.

**Description:** Review of algebra, trigonometry, analytic geometry, and introduction of elementary calculus in preparation for Engineering Analysis I.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### ENGR 101. Engineering Analysis I - QR 4 Units

**Term Typically Offered:** Fall, Spring, Summer

**Prerequisite(s):** A grade of C- or better in ENGR 100 or a grade of C- or better in an equivalent course or appropriate math placement score.

**Description:** Introduction to vector methods and development and use of differentiation and integration to solve engineering problems, including those involving motion, related rates, optimization, moments and centers of mass.

**Note:** Credit will not be granted for both ENGR 101 and MATH 205.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### ENGR 102. Engineering Analysis II 4 Units

**Term Typically Offered:** Spring, Summer

**Prerequisite(s):** A grade of C- or better in ENGR 101.

**Description:** Development and use of: integrating techniques, transcendental functions, vectors in three dimensions, polar coordinates, and power series to solve engineering problems, including work, hydrostatic force, statics, heating, cooling, and catenaries.

**Note:** Credit will not be granted for both ENGR 102 and MATH 206.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### ENGR 110. Engineering Methods, Tools, and Practice I 2 Units

**Term Typically Offered:** Fall, Spring

**Prerequisite(s):** Must be a Speed School of Engineering Student.

**Description:** ENGR 110 is designed to provide first-year engineering students with an introduction to critical thinking, essential methods, tools and skills for success in engineering. Activities and assignments will focus on developing skills and knowledge in: engineering professionalism (ethics, culture, and risk), basic programming, graphical communication, problem solving, design analysis, and teamwork (including diversity and inclusion).

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

### ENGR 111. Engineering Methods, Tools and Practice II 2 Units

**Term Typically Offered:** Spring, Summer

**Prerequisite(s):** ENGR 110.

**Fee:** An additional \$9.00 is charged for this course.

**Description:** ENGR 111 requires students to apply and demonstrate the skills developed in ENGR 110 by successfully completing a team design project. Oral and written presentations are required.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

**ENGR 112. Advanced Engineering Methods, Tools, and Practice 2 Units****Term Typically Offered:** Fall Only**Prerequisite(s):** Must be a Speed School of Engineering Student that met all requirements and received Transition to Engineering (T2E) credit for ENGR 111.**Description:** ENGR 112 advances students with engineering methods, tools, and skills introduced during their Transition to Engineering (T2E) course. Topics and assignments focus on the in-depth engagement with engineering tools for modeling, design analysis, visualization, programming, and team development. Students gain experience in project management, identifying constraints, accepting and providing critical analysis, iterating to refine their work and technical report writing. A student course fee will be attached to this course that mirrors the course fee for ENGR-110**Note:** A student cannot receive credit for both ENGR-110 and ENGR-112.For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)**ENGR 121. Engineering Foundations 3 Units****Term Typically Offered:** Fall Only**Prerequisite(s):** Admission to Speed School of Engineering.**Description:** Introduction to critical thinking, essential methods, tools and skills for success in engineering. Activities and assignments focus on developing skills, knowledge and experience in engineering professionalism and ethics, basic programming, graphical communication, electrical circuits, problem solving, design analysis, and teamwork. Students complete two team-based projects through which they apply the methods and tools they are learning. Oral and written presentations are required.**Note:** Students cannot receive credit for ENGR-121 and ENGR-110 and ENGR-111.For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)**ENGR 150. Engineering Graphics Fundamentals 2 Units****Term Typically Offered:** Fall, Spring, Summer**Prerequisite(s):** Must be a Speed School of Engineering Student.**Description:** An introduction to the concepts of engineering graphics including 2-dimensional and 3-dimensional drawings and related industry standards. Freehand sketching and computer generated 2D and parametric solid model (3D) drawing is included.For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)**ENGR 151. Engineering Graphics Technology 1 Unit****Term Typically Offered:** Fall, Summer**Prerequisite(s):** ENGR 110.**Description:** This course builds on manual drawing skills learned in ENGR 110, and introduces students to the concepts of engineering graphics using two-dimensional and three-dimensional computer aided drawing programs, dimensioning of drawings and applicable industry standards are also included.For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)**ENGR 165. e4usa Portfolio Evaluation Credit 2 Units****Grading Basis:** Pass/Unsatisfactory**Term Typically Offered:** Fall Only**Description:** Credit for this course will be granted to students who successfully complete the e4usa (Engineering for Us All) program, or other similar high school engineering curricular programming, matriculate into the Speed School of Engineering, and obtain a passing evaluation of their e4usa (or similar) portfolio of work.For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)**ENGR 170. Special Topics in First Year Engineering Mathematics 4 Units****Grading Basis:** Pass/Fail**Term Typically Offered:** Fall, Spring, Summer**Description:** Investigation of math topics related to fundamentals of engineering analysis that are not covered in regular Engineering Analysis courses. Specific topics will be announced in the Schedule of Courses.For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)**ENGR 181. Foundations in Applied Mathematics for Engineering 3 Units****Term Typically Offered:** Fall Only**Prerequisite(s):** Admission to either Speed School of Engineering or A&S pre-engineering and ACT Math sub-score of 22+ or SAT Math sub-score of 540+ or Accuplacer QRAS 250+ or successful completion of GEN 104.**Description:** Review of essential algebraic properties and operators. Introduction to functions and the use of linear, quadratic and trigonometric functions to model physical systems. Formulate and solve word problems involving rates, average rates of change, finding maximum or minimum values, and kinematic problems for one and two link planar robotic arms. This course may not be used for credit toward the J.B. Speed School of Engineering B. S. and M. Eng. Degrees. B. Speed School of Engineering B. S. and M. Eng. Degrees.**Note:** This course may not be used for credit toward the J.For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)**ENGR 201. Engineering Analysis III 4 Units****Term Typically Offered:** Fall, Spring, Summer**Prerequisite(s):** A grade of C- or better in ENGR 102.**Description:** Development and use of: partial derivatives, Lagrange multipliers, Fourier series, vector-valued functions, and multiple integrals to solve engineering problems, including those involving thermodynamics, motion, fluid flow, curl, flux, and divergence.**Note:** Credit will not be granted for both ENGR 201 and MATH 301.For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

<p><b>ENGR 205. Differential Equations for Engineering</b> <b>2 Units</b>  <b>Term Typically Offered:</b> Fall, Spring, Summer  <b>Prerequisite(s):</b> ENGR 201.  <b>Description:</b> First- and higher-order differential equations (DE), systems of DE, partial DE, difference equations, numerical methods, Laplace transforms, engineering applications involving mechanical vibrations, electrical circuits, impact forces, and mixing problems.  <b>Note:</b> Credit will not be granted for both ENGR 205 and MATH 405.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>	<p><b>ENGR 330. Linear Algebra for Engineering</b> <b>2 Units</b>  <b>Term Typically Offered:</b> Fall, Spring, Summer  <b>Prerequisite(s):</b> ENGR 201.  <b>Description:</b> Elimination and LU-factorization, dimension, rank, and nullspace, linear transformations and similarity, orthogonally and least squares, eigentheory and diagonalizability, linear differential equations and systems of linear differential equations.  <b>Note:</b> Credit will not be granted for both ENGR 330 and MATH 325.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>
<p><b>ENGR 209. Summer Research Project</b> <b>1 Unit</b>  <b>Grading Basis:</b> Pass/Fail  <b>Term Typically Offered:</b> Summer Only  <b>Prerequisite(s):</b> Permission of the department.  <b>Description:</b> Selected students will participate in a ten week research experience with a specific faculty member within their engineering department. Departments include: Bioengineering, Chemical Engineering, Civil Engineering, Computer Engineering and Computer Science, Electrical and Computer Engineering, Industrial Engineering, and Mechanical Engineering. Students will meet as a group three times in the summer semester and will be required to spend a total of five hours per week working with their faculty mentor. Oral and written presentations at the end of the summer semester are required.  For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>	<p><b>ENGR 389. Co-op Education II</b> <b>0 Units</b>  <b>Grading Basis:</b> Pass/Fail  <b>Term Typically Offered:</b> Fall, Spring, Summer  <b>Prerequisite(s):</b> BE 289 OR CEE 289 OR CHE 289 OR CSE 289 OR ECE 289 OR IE 289 OR ME 289.  <b>Description:</b> Second cooperative education work term, at Part-time status, in an area directly related to the field of specialization of student's degree program. Required for Professional School of Engineering students.  For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>
<p><b>ENGR 289. Co-op Education I</b> <b>0 Units</b>  <b>Grading Basis:</b> Pass/Fail  <b>Term Typically Offered:</b> Fall, Spring, Summer  <b>Prerequisite(s):</b> BE 288 OR CEE 288 OR CHE 288 OR CSE 288 OR ECE 288 OR IE 288 OR ME 288.  <b>Description:</b> First cooperative education work term, at Part-time status, in an area directly related to the field of specialization of student's degree program. Required for Professional School of Engineering students.  For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>	<p><b>ENGR 393. Independent Study in Engineering Fundamentals</b> <b>1-6 Units</b>  <b>Prerequisite(s):</b> Consent of a faculty sponsor.  <b>Description:</b> Independent study in any engineering fundamentals related area under the guidance of a faculty member.  For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>
<p><b>ENGR 307. Numerical Methods for Engineering</b> <b>2 Units</b>  <b>Term Typically Offered:</b> Fall, Spring, Summer  <b>Prerequisite(s):</b> ENGR 201 Errors and error propagation, solving one and several equations, polynomial interpolation and divided differences, least squares approximation, numerical differentiation and integration, eigenvalues, eigenvectors, solving ordinary and systems of differential equations.  <b>Description:</b>  <b>Note:</b> Credit will not be granted for both ENGR 307 and MATH 407.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>	<p><b>ENGR 400. Special Topics in Engineering Fundamentals</b> <b>1-6 Units</b>  <b>Term Typically Offered:</b> Occasionally Offered  <b>Description:</b> Investigation of topics in any engineering fundamentals related areas that are not covered in regular courses. Topics will be announced in the Schedule of Courses.  For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>
<p><b>ENGR 307. Numerical Methods for Engineering</b> <b>2 Units</b>  <b>Term Typically Offered:</b> Fall, Spring, Summer  <b>Prerequisite(s):</b> ENGR 201 Errors and error propagation, solving one and several equations, polynomial interpolation and divided differences, least squares approximation, numerical differentiation and integration, eigenvalues, eigenvectors, solving ordinary and systems of differential equations.  <b>Description:</b>  <b>Note:</b> Credit will not be granted for both ENGR 307 and MATH 407.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>	<p><b>ENGR 405. Practicum in Engineering Fundamentals Education</b> <b>1-3 Units</b>  <b>Term Typically Offered:</b> Fall, Spring, Summer  <b>Prerequisite(s):</b> ENGR 205 and Consent of Instructor.  <b>Description:</b> A guided learning experience in inquiry-based instructional techniques and best practices in STEM education that includes field experience as an undergraduate teaching assistant. Permission to enroll required. May be repeated for a maximum of 3 hours.  For class offerings for a specific term, refer to the Schedule of Classes (<a href="http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm">http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm</a>)</p>

**ENGR 589. Research Methods for Engineering and Engineering Education**  
**3 Units**

**Description:** This course will have students: learn how to engage in ethical conduct as researchers; acknowledge, reference, and document resources in organized ways; review and evaluate research in a critical and professional manner; synthesize existing literature to craft arguments; complete training for human subjects research (CITI Training); and write research questions that align with methods. It will also provide an overview of research methods: qualitative, quantitative, and mixed research methods.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)