# INQ 250 PH: Take a Dive – How Things Work?

## Course Information:

**Instructor**: Dr. Rajesh Vuddandam (Dr. Raj)
**Email**: vuddandam@roanoke.edu
**Office**: Trexler 270J; **Phone**: 540-375-2010; **Office Hours**: MWF 9am -10:30am or by appointment
**Lecture/Lab time**: MWF 1:10 – 3:10 pm; **Lecture/Lab Room**: Trexler 274; **Units**: 1

## Course Description:

This scientific reasoning course is based on the theme of sky diving and deep-sea diving, designed to address the fundamental questions "why study motion and what factors contribute to the motion of an object?". The basic laws of physics applicable to motion will be investigated through experimentation.

## Course Restrictions:

If you have received credit for other higher-level physics courses at Roanoke College, you cannot receive credit for this course.

## Course Prerequisites:

None

## Textbook and/or Resource Materials:

- Calculator (required): A scientific calculator.
- Textbook (optional): Jackson, Laws, and Franklin; Explorations in Physics, Wiley & Sons, Inc.; 2003

## Inquire:

Inquire Access (required) – Inquire is a learning management system that will be used to post all course activity handouts, assignments, project details, syllabus etc., and can be accessed using Roanoke college's student login credentials using the following link https://inquire.roanoke.edu/

## Student Expectations:

This course expects you to spend at least 12 hours of work each week inside and outside of class.

## Learning Outcomes:

All sections of INQ 250 share a common set of learning outcomes related to the skills students will develop in this course. These outcomes are:

- Students will be able to describe and apply scientific methodologies appropriate for the course discipline and topic, including the ability to design and conduct simple experiments and to draw conclusions based upon data.
- Students will be able to write about course topics clearly and effectively.
- Students will be able to interpret quantitative information related to the course topic.

Upon completion of this section of INQ250, students will be able to:

- operate computer-interface sensors and lab equipment
- make measurements and collect data
- analyze and interpret graphical data
- communicate their scientific findings through reports, class discussions, and oral presentations
- understand how a scientific theory relating to forces and motion can be developed from experimental observations
- use the scientific method to devise their own experiments to test the validity of hypotheses

## Course Format/Teaching Methodology:

This scientific reasoning course, "Take a Dive: How Things Work," explores the fundamental principles of motion through hands-on investigation with minimum formal lectures. Rather than traditional lectures, the class employs an inquiry-based approach centered on experiments, computer simulations, and collaborative group activities. The inquiry-based curriculum emphasizes the development of scientific reasoning skills

(process) over the acquisition of specific content knowledge.

## Grading Policy:

Class grades will be calculated according to the following distribution

| Category | % Distribution |
|---|---|
| Attendance/Class Participation/Quizzes | 5% |
| Handouts/Assignments (Individual) | 20% |
| Unit A Exam (Individual) | 15% |
| Unit D Exam (Individual) | 15% |
| Unit A Project (Team) | 15% |
| Unit D Project (Team) | 15% |
| Final Exam (Comprehensive) | 15% |
| **Total** | **100%** |

The final grade will be assigned as follows, although the instructor reserves the right to lower the limits slightly at their discretion considering factors such as student attendance, class participation, and class performance.

| Points | Grade | Points | Grade |
|---|---|---|---|
| <60 | F | 77-79 | C+ |
| 60-62 | D- | 80-82 | B- |
| 63-66 | D | 83-86 | B |
| 67-69 | D+ | 87-89 | B+ |
| 70-72 | C- | 90-92 | A- |
| 73-76 | C | ≥93 | A |

## Attendance Policy:

Regular attendance is required for this course. The instructor records attendance via INQUIRE, and it contributes directly to your final grade as detailed in the grading policy. Students must notify the instructor promptly of any excused absence and are personally accountable for all missed content and assignments.

## Class Participation:

This course emphasizes active, in-class collaboration, requiring thorough preparation before each session and engaged participation during class to succeed. Your grade is directly influenced by this participation and the completion of in-class activities, which cannot be made up without an excuse as defined in the Late/Makeup Work Policy. This approach ensures a deeper, practical understanding that passive consumption of materials cannot provide.

## Quizzes:

The instructor will administer quizzes, both online and in-person, as deemed necessary throughout the course. Your performance in the quizzes will contribute directly to your final grade, as outlined in the course grading policy.

## Handouts:

This course utilizes handouts to deliver instructional content. Students are responsible for actively completing these handouts during class by adhering to the instructor's guidance and taking notes. Submission of a final PDF copy to INQUIRE by the due date is required.

**Assignments:**
Assignments are designed to help you apply and deepen your understanding of course material. All work must be submitted as a PDF through the INQUIRE platform by the specified due date. It is essential to follow all instructions carefully and employ critical thinking to fully demonstrate your comprehension.

**Exams:**
You will take two exams (on Unit A & Unit D) and one comprehensive final exam on the dates listed in the course schedule. Final examinations are scheduled at the times designated by the Registrar's Office. Make-up is only offered for excused reasons and requires advance notice (except in emergencies). Failure to obtain an excuse will result in a zero for the missed exam.

**Projects:**
You will complete two group projects (on Unit A & Unit D). Full and equal participation from every group member is required. Specific instructions will be released prior to each project on INQUIRE, and its weight on your final grade is detailed in the grading policy. Refer to teamwork policy on group projects.

**Late/Make-up Work Policy:**
Late submissions are not accepted without a valid, instructor-approved excuse. Students must proactively communicate in any circumstances that may delay their submission. The approval of any excuse and the granting of a makeup opportunity is solely at the instructor's discretion.

**Teamwork:**
The group project for this course is designed to achieve two primary objectives:

1. Academic: To develop your ability to collect, analyze, and evaluate real-world physical measurements, including the management of errors and outliers.
2. Professional: To cultivate essential teamwork skills, including sharing ideas, managing responsibilities, resolving conflicts, and providing constructive peer feedback.

Policy on Unsatisfactory Team Participation:

A student who engages in a persistent pattern of unprofessional behavior—including repeated absences, non-participation, failure to complete assigned tasks, or conduct that hinders group progress—may be subject to removal from the team. The process for this is as follows:

1. Open Discussion: The group must first attempt to resolve the issue through a direct and respectful conversation with the member in question.
2. Documentation: The group leader is responsible for documenting specific instances of concerning behavior (e.g., missed meetings, uncompleted work). This written record is essential.
3. Group Consensus: If the behavior continues, a majority of the group must agree that removal is necessary.
4. Instructor Review: The group leader will present the documented evidence to the instructor to discuss the member's removal.
5. Final Decision: The instructor will review the case and make the final decision regarding the member's status and any subsequent academic consequences.

*Note: Covering for a non-participating member undermines the team's development and is discouraged.*

## Other Policies

### Generative AI Usage:

In this course, using AI as a learning tool is **permitted with restrictions**. However, you should consider the following conditions/concerns:

- ✅ Permitted For: Brainstorming (ideation) and learning support.
- ❌ Not Permitted For: Generating content to be submitted as your own work.
- 📚 Citation: Always reference any AI tool you use for assistance.
- 🧠 Accountability: You must be able to explain and defend all your work.
- 📝 Exams: Absolutely no use of AI or any other external resources.

The goal of this course is to assess your understanding, not AI's output.

### Academic Integrity:

Your learning and integrity are at the core of your RC education. For this reason, you must follow the rules outlined in the College AI policies. See https://www.roanoke.edu/aihandbook

### Writing Center:

The Writing Center Roanoke College, located on the Lower Level of Fintel Library (Room 5), offers free tutorials focused on writing projects and oral presentations for students working in any field. Writers and presenters at all levels of competence may visit the Writing Center at any point in their process—including brainstorming, drafting, organizing, editing, or polishing presentation skills—to talk with trained peer tutors in informal, one-on-one sessions. The Writing Center is open Sunday through Thursday from 4 to 9 PM. Simply stop in, or schedule an appointment at www.roanoke.edu/writingcenter. Questions? Email writingcenter@roanoke.edu or call 540-375-4949.

### Subject Tutoring:

Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4-9 PM, Sunday-Thursday. Subject Tutors are highly trained, current students who offer free, one-on-one (and small group) tutorials in over 80 courses taught at Roanoke College, including: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, and Social Sciences. Check out all available subjects and schedule 30- or 60-minute appointments at www.roanoke.edu/tutoring. If you have a question, feel free to stop by, or contact us at subject_tutoring@roanoke.edu or 540-375-2590.

### Accessible Education Services (AES):

AES is located on the first floor of the Bank Building. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of disability along with recommendations from the qualified specialist. Please contact Dustin Persinger, Assistant Director of Academic Services for Accessible Education, at 540-375-2248 or by e-mail at aes@roanoke.edu to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Dustin Persinger at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester. The testing center, also located on the first floor of the Bank Building, can be reached at 540-375-2247. https://www.roanoke.edu/inside/aes

### Student Health and Counseling Services (SHCS):

Student Health & Counseling Services supports students through in-person health appointments. Please see https://www.roanoke.edu/shcs for more information and to access services.

**Tentative Course Schedule:**

This course expects students to spend at least 12 hours of work each week inside and outside of class.

| Dates | Topic |
|---|---|
| **UNIT A - Force Motion & Scientific Theories** | |
| Aug 27 – Sep 30 | Unit A: Fundamental Concepts related to Sky Diving |
| Oct 1 (Wed) | Unit A Exam |
| Oct 3 - 10 | Unit A Project |
| Oct 11 - 19 | **Fall Break!** |
| Oct 24 | Unit A Project – Writing Report/Presentation Preparation |
| Oct 27 (Mon) | Unit A Project Presentations |
| **UNIT D – Buoyancy, Pressure, and Flight** | |
| Oct 29 – Nov 14 | Unit D: Fundamental Concepts Related to Deep Sea Diving |
| Nov 17 | Unit D Exam |
| Nov 19-22 | Unit D Project |
| Nov 26-28 | **Thanksgiving Break!** |
| Sep 1 – Dec 5 | Unit D Project – Writing Report/Presentation Preparation |
| December 5 | Unit D Project Presentations |
| December 8 | Review for Final Exam |
| December 10 (Wed) | Final Exam: 2:00 pm – 5:00 pm |