

## **GLY6932 and GLY4930: Analytical Instrumental Methods**

**Semester: Fall 2024**

**Credits: 1**

**Meeting Location: Department of Geological Sciences, Williamson Hall, Room 210**

**Meeting Time: Wednesday 9:35am – 10:25am**

### **INSTRUCTORS**

**Dr. George Kamenov** – kamenov@ufl.edu, 363 Williamson Hall, 846-3955, office hours T 9:30-11:30, F 9:30-11:30 and by appointment;

**Dr. Jason Curtis** – curtisj@ufl.edu, 372 Williamson Hall, 392-2296, office hours M 9:30-11:30, Th 9:30-11:30 and by appointment;

**Dr. Dogancan Yasar** – iyasar@ufl.edu, 371 Williamson Hall, office hours T 9:30-11:30, F 9:30-11:30 and by appointment;

### **COURSE MATERIALS**

No book required. Training materials for the various instruments and sample preparation protocols will be provided by the instructors.

**OVERALL COURSE GOAL:** To provide students with background knowledge of various analytical methods used in Earth and Environmental Sciences and practical skills necessary to prepare and analyze samples for their projects.

### **COURSE OBJECTIVES**

1. Understand basic practices for laboratory safety and various sample preparation techniques used in Earth and Environmental Sciences.
2. Learn basic operations of different analytical instruments (SEM, XRF, XRD, Noble Gas MS, IRMS, ICP-MS, MC-ICP-MS, Laser Ablation) utilized for elemental, isotopic, and geochronological analyses in the Earth and Environmental Sciences.
3. Apply the knowledge to hands-on operation of one or more of the above analytical instruments.
4. Complete data collection for their project.
5. Learn how to reduce, plot, interpret, and present analytical data.

### **ASSESSMENTS AND GRADING**

**Grading Scheme:** A =  $\geq 93\%$ , A- = 90-92.99, B+ = 87-89.99, B = 83-86.99, B- = 80-82.99, C+ = 77-79.99, C = 73-76.99, C- = 70-72.99, D+ = 67-69.99, D = 63-66.99, D- = 60-62.99, E < 60

**Possible points:**

ATTENDANCE **10%**; LAB WORK **70%**; PROJECT COMPLETION **20%**

**ATTENDANCE RUBRIC:**

Attendance is critical to successful completion of this course. Attendance will be taken during each class. Students are allowed one “personal day” for the semester, after which each absence that does not meet university criteria for “excused” will result in subtraction of 1 point. Students are expected to complete all assignments and lab work by the end of the semester and will not be granted an alternate due date unless they have an acceptable reason (e.g. medical emergency, observance of religious holiday) or pre-arranged consent of the instructor. These requests must be timely and accompanied by all necessary written documentation.

**LAB WORK RUBRIC:**

Each student will either have their own or will be assigned a project at the beginning of the class. Students will earn 5 points per week for work performed on the project. The work will be conducted in one or more of the labs (Clean Lab, SEM, XRF, XRD, Noble Gas MS, IRMS, ICP-MS) in the Department of Geological Sciences. The lab work will involve sample preparation, basic operations of the analytical instruments, and performing elemental, isotopic, and/or geochronological analyses.

**PROJECT COMPLETION RUBRIC:**

After the completion of the lab work each student will reduce, plot, interpret, and present the collected analytical data.

**Late Work Policy:** Project completion turned in late without an excused absence will be subject to a grade reduction of 10%.

**Makeup Policy:** If you have a preexisting conflict for lab work or project completion, an alternative meeting time will be arranged with one or more of the course instructors. In case of sudden illness or family emergency, please notify the instructor as soon as possible (within no more than a week). Appropriate documentation may be required. No make-ups will be permitted for other, unexcused absences.

**Email:** All email communications MUST be sent from (and will be sent to) your Gatorlink accounts. Instructors will respond to email within 24 hours Monday through Friday.

**Course Evaluation**

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://gatorevals.aa.ufl.edu/>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://gatorevals.aa.ufl.edu/>.

**Students Requiring Accommodations**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

University Policy on Accommodating Students with Disabilities: Students requesting accommodation for disabilities must first register with the Dean of Students Office (is <http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

### **University Honesty Policy**

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.”

The Honor Code at <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.

University Policy on Academic Misconduct: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at <http://www.dso.ufl.edu/students.php>.

Netiquette: Communication Courtesy: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats:  
<http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf>

### **Campus Resources:**

#### **Health and Wellness**

U Matter, We Care: If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352-392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

**Sexual Assault Recovery Services (SARS):** Student Health Care Center, 392-1161.

#### **Software Use**

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### **Student Privacy**

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:

<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### **COURSE SCHEDULE**

**8/28/24** Course introduction and project assignment for each student.

**9/4/24** Handling hazardous waste, GatorTracs, and safety training for the labs in the Department of Geological Sciences.

**9/11/24** Clean Lab sample preparation for trace elements and isotopes for ICP-MS.

**9/18/2024** ICP-MS elemental (major and trace) analyses, including standard selection and preparation, high-resolution work, errors, detection limits.

**9/25/24** MC-ICP mass-spectrometry instrumentation and Traditional and Non-Traditional Isotope analyses.

**10/02/24** Laser-Ablation MC-ICP-MS U-Pb dating of zircons and other U-Th minerals, data reduction with "CALAMARI" and "ISOPLOT", concordia, standards, errors, detection limits

**10/09/24** Heavy mineral separation procedures.

**10/16/24** SEM sample preparation, instrumentation, and analysis.

**10/23/24** General X-Ray Fluorescence and X-Ray Diffraction Theory.

**10/30/24** XRF and XRD Sample Preparation, instrumentation bench top and portable XRF, and hands on analysis with portable XRF.

**11/06/24** Ar-Ar Geochronology, theory, sample preparation and instrumentation.

**11/13/24** Stable Isotope mass-spectrometry instrumentation and analysis.

**11/20/24** Review of lab work, data reduction, completion of project.

**11/27/24** No class, **Thanksgiving Day Break**

**12/04/24** Student presentation of data collected.