

**Reports & Updates from Faculty Assembly Committees,  
Faculty Resource Center, and Instructional Design Center**  
11/12/14

**General Education Curriculum Committee (GECCo)**

Chair: Ashwani Vasishth ([vasishth@ramapo.edu](mailto:vasishth@ramapo.edu))

The General Education Curriculum Committee has finalized the Critical Inquiry Assessment Report and the Interdisciplinary Assessment Report from the Spring 2014 semester. Both these reports are being posted to the [GECCo webpage](#), where they can be accessed using the password GECCo. Sub-committees are currently conducting the Information Literacy Assessment and the Oral Communication Assessment, during the Fall 2014 semester. At the same time, Sub-committees are preparing to conduct the International and Intercultural North America Assessments during the Spring 2015 semester.

The President's Committee on Campus Sustainability was inaugurated at a meeting with President Peter P. Mercer on October 17, 2014. Subsequently the Committee participated at a brainstorming session during the National Campus Sustainability Day event held on campus on October 22, 2014, and is currently working to finalize a proposed Mission and Guiding Principles statement.

**Academic Review Committee (ARC)**

Chair: Thierry Rakotobe-Joel ([trakotob@ramapo.edu](mailto:trakotob@ramapo.edu))

<http://www.ramapo.edu/fa/arc/>

ARC endorses proposals for two new minors (Earth Science, Neuroscience) and brings them to this FA meeting for approval by the Faculty Assembly. The proposals are appended at the end of this document.

**Task Force on Academic Engagement and Excellence (AEE)**

Chair: Eric Karlin ([ekarlin@ramapo.edu](mailto:ekarlin@ramapo.edu))

Reminder: please see the [Charge of the Task Force on Academic Excellence and Engagement](#) on the FA website.

## Earth Science minor

### I. Program Summary

The proposed standalone minor in Earth Science consists of five courses (20 credits), three of which are required, whilst two are electives. The minor will provide students with a firm grounding in earth science, including both physical and historical geology (the basis of all earth science majors). Students will gain experience in geological cartographic techniques, be able to identify the major minerals and rocks, and gain practice in geological field techniques. The electives provide an opportunity to explore a wide range of aspects of earth science. Research opportunities in geology and paleontology are available.

Of the five courses, two (both of which are required) have laboratory sections, providing students plenty of hands-on experience in both laboratory and field settings. These courses are also writing intensive, giving students plenty of opportunity to practice and improve their written and oral communication skills.

There are no cooperative arrangements with other institutions or external agencies. The proposed program falls within the institutional mission.

### II. Program Assessment

#### Program Goals, Measurable Student Learning Outcomes, Assessment

Program Goals (numbered) and Student Learning Outcomes (lettered). Assessment measures, and the courses in which assessment will take place, are indicated by the lower case roman numerals.

1. Graduates of the minor in Earth Science will have a foundational knowledge of historical and physical geology, and the Earth's context in the solar system. *SLOs:*
  - a. Demonstrate understanding of the formation and history of the Earth, life on Earth, and Earth's physical processes. *Assessment:*
    - i. Final exam questions (GEOL 105, 326, PHYS 103/345)
    - ii. Lab exercises (GEOL 105, 326)
2. Graduates of the minor will be able to use laboratory and field techniques to identify, analyze, and interpret geological materials. *SLOs:*
  - a. Identify common rocks, minerals, and fossils in the laboratory and field. *Assessment:*
    - i. lab exercises (GEOL 105, 326)
    - ii. lab final exams (GEOL 105, 326)
  - b. Read topographic and geological maps. *Assessment:*
    - i. lab exercises (GEOL 105)
  - c. Collect, record and analyze geological field observations including lithological and structural information. *Assessment:*
    - i. Field lab reports (GEOL 105, 326)
    - ii. Field notebooks (GEOL 105, 326)
3. Graduates of the minor will be able to communicate effectively with diverse audiences. *SLOs:*
  - a. Technical oral presentations
  - b. Technical written papers: synthesis reports (literature reviews), field reports.
  - c. Informal communications: communicating technical information to non-scientist stakeholders

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- i. Assessment for all 3 outcomes will take place in the assignments (presentations, field reports, lit reviews, informal communication) in GEOL 105 and 326.

Assessment would take place within the 3 required courses (two of which – including the specific measures indicated - are already mined on a regular basis for assessment within the Environmental Science major). All of the measures indicated above are direct measures of assessment. For some students (those seeking Teacher Education certification), we may also be able to use Earth Science Content Praxis test scores as an indirect assessment measure.

As for all other programs at Ramapo, an Assessment Plan will be submitted early in the Fall semester, and reviewed by first the School Assessment Committee (SAC), and then College Wide Assessment Committee (CWAC), the Dean, and the Vice Provost for Curriculum and Assessment. Assessment will be conducted in the Fall and Spring semesters, with a final report being submitted to the SAC and then the CWAC, the Dean, and the Vice Provost.

#### Alignment of Program Goals to All-College Goals

This table shows the alignment of the nine all-college goals with the three programmatic goals.

<i>All-college goals</i>	<i>Goal 1 (geo-knowledge)</i>	<i>Goal 2 (geo-skills)</i>	<i>Goal 3 (communication)</i>
Interdisciplinary Analysis	x	X	
Experiential learning		x	
Intercultural/International			
Critical Inquiry	x	x	
Communication			x
In-depth knowledge	X	x	
Understanding the world	x	x	
Awareness			
Engagement			

### **III. Program's Institutional Context:**

#### College's Mission:

Ramapo College has four pillars of learning, two of which are foundational to this minor: Interdisciplinary Education and Experiential Learning. Another value important to the College is Sustainability, which is a theme running through the minor.

#### Strategic Plan:

- Goal 1 of the Strategic Plan speaks to advancing academic excellence through (amongst other things) Minors. With lab courses and elective options based in experiential learning, this minor rests heavily on the Experiential Learning Pillar.
- Achievement Target 1.1.2 (extended experiential activity): although this target is for majors rather than minors, the program electives include a Research Project option for extended experiential activity.

#### School of Theoretical and Applied Science's Mission:

The minor addresses several of the goals embedded within TAS's mission, including science literacy, scientific understanding among non-science majors, and meeting the needs of the contemporary marketplace and community.

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#### IV. Impact on Other Ramapo Undergraduate Programs

The minor will utilize existing courses; most are either required or elective courses in the Environmental Science major<sup>1</sup>; the remainder are electives in the Environmental Studies<sup>2</sup> and Physics major. The required courses, and most of the electives, are offered once a year. Most of these courses usually have a couple of spare seats each time they are offered, which would accommodate students in the minor who are outside of these majors. These three majors have all indicated there would be no problem in accommodating a few extra students. Finally, as a minor, this program would not compete with any majors.

Currently, the Environmental Science major has two advisement tracks, the second of which was created for students seeking Earth Science content-area endorsement in teacher education. If this minor is approved, it will simplify the Environmental Science major by eliminating the “teaching” track. The Environmental Science faculty are eager to see this happen.

#### V. Program’s Need

##### Interest from Students

Every year for the past 10 years, a couple of students express interest in a geology / earth science minor. (These are usually Environmental Science or Environmental Studies students.) We have even, in the last 2 years, had 2 students leave Ramapo because we haven’t offered a geology program.

The Teacher Education program offers Content Certification in Earth Science (High School); but of all the content areas Ramapo offers, Earth Science is the only subject that we do not offer a major or minor in. Therefore, even though there are only a small number of students pursuing Earth Science endorsement, it is logical that we would have a stand-alone minor in this subject area.

##### College’s Strategic Plan:

Goal 1 of the Strategic Plan speaks to advancing academic excellence through (amongst other things) Minors. With lab courses and elective options based in experiential learning, this minor rests heavily on the Experiential Learning Pillar. This Goal also has a specific Target for experiential learning, which, whilst it is intended for majors rather than minors, the proposed minor’s electives include a research project option for extended experiential activity.

##### Employment opportunities

In addition to students using the Earth Science minor for middle school science or high school earth science certification, the Earth Science minor can also be used to access employment opportunities in the environmental and geological consulting sector (which is thriving in New Jersey), by providing geological skills beyond those acquired within the Environmental Science major, as well as opening doors to studying the geosciences in graduate school. According to the BLS<sup>3</sup>, employment of geoscientists is projected to grow 16% from 2012 to 2022, which is faster than the average for all occupations (11%). Median annual wages for 2012 were \$90,890

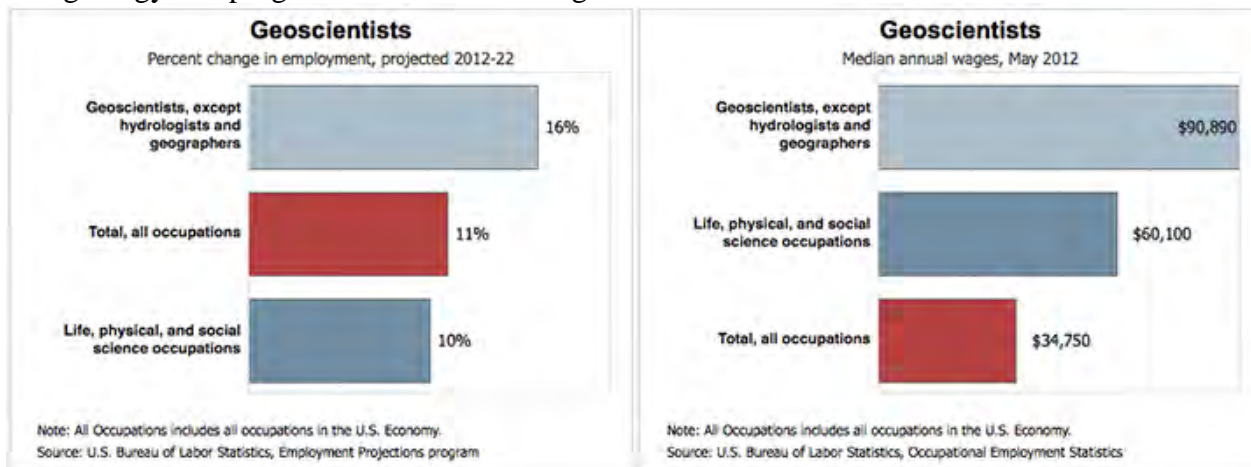
<sup>1</sup> GEOL courses are offered through the Environmental Science program

<sup>2</sup> GEOG courses

<sup>3</sup> <http://www.bls.gov/ooh/life-physical-and-social-science/geoscientists.htm#tab-1> accessed 10/1/14

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(compared with \$34,750 for all occupations). Whilst an earth science *major* is not feasible at Ramapo, an earth science minor, particularly when combined with a science major, will open additional (and lucrative) doors for our students, both for employment, and in addition, give students a better chance of getting into earth science graduate programs (and thus, employment as a geoscientist). Some local graduate programs (e.g. Rutgers Newark, Columbia) accept students into geology MS programs with such a background.



Other Programs in NJ

- NJCU, Montclair, Rider and Rutgers (New Brunswick) have minors in geology/geoscience/earth and environmental science. The only program similar in scope to the proposed minor is at Rider; the others are strictly geological.
- Majors are listed in the table below. Given the broad scope of the proposed minor, the majors to be compared with are entitled Earth Science, which are William Paterson and Kean.

4006	Geological and Earth Sciences/Geosciences		
A.S.	Earth Science	Middlesex County College	400601
B.A.	Earth Science	William Paterson University of NJ	400601
B.A.	Earth Sciences	Kean University	400601
B.A.	Geological & Geophysical Sciences	Princeton University	400699
B.A.	Geological Sciences	Fairleigh Dickinson University	400601
B.A.	Geology	Rutgers University / Newark	400601
B.A.	Geology	Richard Stockton College Of New Jersey	400601
B.A.	Geoscience	New Jersey City University	400601
B.S.	Earth Science	Kean University	400601
B.S.	Geological Sciences	Rutgers University / New Brunswick	400601
B.S.	Geology	Richard Stockton College Of New Jersey	400601
B.S.	Geology	Rutgers University / Newark	400601
B.S.	Geoscience	Montclair State University	400601
B.S.	Geoscience	New Jersey City University	400601
B.S.	Geosciences	Rider University	400601

**VI. Anticipated Enrollment**

Based upon unsolicited student interest expressed to date, we would expect 2-3 students per year enrolling in the minor, for a total of approximately 10-15 students at any one time.

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## VII. Additional Resources Needed, First Five Years

### Organization:

- Home school: Theoretical and Applied Science
- In collaboration with: Environmental Science, Environmental Studies, Physics
- Proposed convening group: E. Rainforth (ENSC), C. Brisson (PHYS), H. Horowitz (ENST)

No additional faculty resources are expected to be needed. The required courses, and most of the electives, are all offered once a year, and typically have a small number (2-3) of spare seats which would accommodate the number of students who have expressed interest.

In terms of facilities, the new Geology Classroom in the renovated G-wing has ample space and facilities for the geology courses, and there is also a new geology faculty research laboratory, in the event that students opt to undertake a research project as one of their electives.

Therefore, it is not thought that any additional resources will be required.

## VIII. Degree Requirements

### Curriculum:

The minor will consist of 5 courses, 4 credits each (total: 20 credits). Course descriptions are appended on the last two pages.

#### **Required courses**

- |          |                                   |                              |
|----------|-----------------------------------|------------------------------|
| GEOL 105 | Fundamentals of Geology (lec/lab) | [writing intensive]          |
| GEOL 326 | Paleontology (lec/lab)            | [writing intensive]          |
| Either:  | PHYS 103                          | Introduction to Astronomy    |
| Or       | PHYS 345                          | Astronomy and Astrophysics I |

#### **Electives – select two from the following (one must be GEOL or ENSC)**

- |          |                                    |
|----------|------------------------------------|
| GEOL 327 | Geology of New Jersey              |
| GEOL 333 | Environmental Geology              |
| ENSC 405 | Global Climate Change <sup>4</sup> |
| GEOG 303 | Water Resources                    |
| PHYS 105 | Meteorology                        |
| PHYS 221 | Environmental Physics              |
- A 4-credit 2-semester geology research project (2 credits of independent study each semester)

### Sequencing:

- GEOL 105 is the prerequisite course for higher-level GEOL courses and ENSC 405.
- Fall courses: GEOL 326, PHYS 221
- Spring courses: GEOL 105, GEOG 303, GEOL 333, ENSC 405. (GEOL 333 and ENSC 405 offered in alternate years.)
- Summer courses: GEOL 327

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<sup>4</sup> ARC submission in progress to revise this course to become “ENSC 3xx Climate Change Science”.

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Advisement information for the typical populations who have enquired about a minor:

1. ENSC majors seeking Earth Science certification:
 

Currently, we have an Earth Science advisement track within the Environmental Science major, which (in conjunction with the 4 year plan for the track) enables students to specialize in Earth Science at the upper level within the major. Because this advisement track was created solely for ENSC students wanting Earth Science certification, the track will be eliminated upon the creation of the minor, because it will no longer be needed. A benefit of the elimination of the Earth Science track in ENSC is that the catalog / degree audits will be simplified. (Note: for teaching, 30 credits of Earth Science are required.)

  - o Currently, students seeking Earth Science certification by following the Teaching Advisement Track have to take *two* additional earth science classes beyond the major in order to reach the 30 credits required for content certification. With the elimination of this track, students would choose appropriate Earth Science electives in the major, and would still need to take the two extra earth science classes to reach the 30 required credits for content certification.
  - o Students wishing to seek Earth Science certification with both the ENSC major and EarthSci minor would take *three* additional earth science classes beyond the major to complete the minor (because two of the required courses in the minor are also required in the major, and no more than two courses can double-count between the major and minor). Although this is one more course than if an ENSC student didn't want the minor, it gives the student the additional credential (the minor).
2. ENSC majors not seeking Earth Science certification:
  - a. Because two of the required courses in the minor are also required in the major, three additional courses are required to complete the minor.
3. ENST majors seeking Earth Science certification:
  - b. Depending on how students fulfill distribution requirements for the ENST majors, they currently take 2-6 courses beyond the major to complete 30 credits for Content Certification. With the option to minor in Earth Science, they would need to take 3 courses, provided the distribution requirements are carefully chosen.
4. ENST majors not seeking Earth Science certification:
  - c. Depending on how students fulfill their distribution requirements within the major, 3-5 courses are required to complete the minor.
5. INSS majors:
  - d. Because two of the required courses in the minor are also required in the major, three additional courses are required to complete the minor.

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**Course Descriptions**

All courses are 4 credits.

**1. Required Courses****GEOL 105 Fundamentals of Geology: lec/lab**

This course will provide an introduction to the geological sciences. The course begins with the underlying geologic principles and the exploration of Plate Tectonics. Subsequent topics include: the formation of the major rock-forming minerals, and common igneous, sedimentary and metamorphic rocks; the major geophysical processes and the formation of resultant features (volcanoes, earthquakes, mountain belts, ocean basins, and structural geologic features); the major surface processes (weathering, erosion, water, ice, and wind); the structure and processes operating in the oceans and atmosphere; and the physical and biological history of the planet. This information will be presented in a plate tectonic framework. GEOL 105 is required for the Environmental Science and Integrated Science Studies majors, the Environmental Science minor, and can be used to fulfill requirements for the Environmental Studies major and minor as well as the 100-level introductory science category of General Education. It is the recommended foundation course for Earth Science teacher certification.

**GEOL 326 Paleontology, Paleoecology, and Paleoenvironments (lec/lab)**

This is an interdisciplinary course in which students use paleontology and sedimentology to interpret ancient environments and the ecosystems they supported. Students begin with a brief review of aspects of geology required for paleontological studies: geologic time, plate tectonics, and sedimentary rocks and their depositional environments. There is also a review of evolutionary theory and ecological and paleoecological principles. Following this, the course is split into two sections. First, there is an overview of the major depositional environments, the typical fossil organisms that are found preserved in them, the process of fossilization, and how the ecosystems of particular environments have changed through time. This is followed by a survey of the history of settings, and use paleontological (biological) and sedimentological (geological) data to reconstruct the paleoecology and ancient physical environment. Lab sessions include fossil identification and analysis and several field visits to sites in New Jersey, Pennsylvania and Connecticut.

**PHYS 103 – Introduction to Astronomy**

A study of the motion and physical properties of bodies of the solar system and the nature and structure of galaxies. Areas covered will include: an historical background, the sun as a star, the properties of light, the apparent motion of celestial bodies, nebulae and pulsars, comets and meteors, astronomical instruments, quasars, and cosmology.

or

**PHYS 345 – Astronomy and Astrophysics I**

This course constitutes a quantitative introduction to the astronomy of the sun, earth, and solar system, with an emphasis on the physical principles involved. Includes celestial mechanics, planetary atmospheres and the physics of comets, asteroids and meteorites. NOTE: It is a 4-credit 300 level Ramapo course. It is an elective course for the Ramapo Engineering Physics Major. This course is taught by NJIT faculty at NJIT. Students will attend the lectures on the Ramapo campus through videoconferencing. Ramapo students will pay the regular Ramapo tuition and will register through the Ramapo website just like any other Ramapo course. Two mandatory observing sessions will be held at Rutgers-Newark's Boyden Observatory

**2. Elective Courses (two required, one must have GEOL prefix)****ENSC 3xx – Climate Change Science**

In this course, we will examine the scientific evidence for global climate change in the modern era, and the natural and human causes of climate change on various timescales. We will examine the probable effects of climate change through the 21<sup>st</sup> century and beyond, including temperature and precipitation changes, and the effects on terrestrial and aquatic ecosystems and natural resources such as soil and



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water. We will look at the human dimension of climate change: the effects on settlements and infrastructure, and health. Finally we will explore the scientific and technological options available to us both now and in the near future that could enable us to begin to decrease the rate of climate change, as well as the policy and economic considerations that will be required in order for us to adapt to our new environment.

### GEOG 303 – Water Resources

An overview of the physical and cultural geography of fresh water. Physical aspects include the hydrologic cycle, regional water budgets, stream flow processes, and groundwater aquifers. Resource management issues include examination of drinking water supplies, irrigation, flood control projects, multiple-use impoundments, floodplain zoning, water pollution, and fresh water fisheries. Case studies will be drawn from the local area and other parts of the world.

### GEOL 327 – Geology of New Jersey

This field course explores New Jersey's 1.5 billion year geologic history through analysis and interpretation of clues left in the rocks. We will examine each of the four provinces of the state, from the bedrock to the surface, focusing on the geologic history of the state and its geologic resources; we will also look at environmental geology issues such as water resources, land use, and waste management. This course includes four full-day field trips and seminars before each trip (and a wrap-up session at the end). All trips are mandatory. This course fulfills the Field Studies requirement for the Environmental Studies major and can be used as an elective in the Environmental Science major and minor, Environmental Studies major, and for Earth Science Teacher Certification.

### GEOL 333 – Environmental Geology

This course studies the interactions between geology and the surface and near-surface environment. First we will examine geologic resources such as water, soils, minerals, and energy; this section will include examination of current extraction including resource limits, alternative resources, and pollution. The second part of the course concerns geological hazards, both generated in the earth's interior (earthquakes and volcanoes) and those acting on the Earth's surface (mass movement, flooding, and coastal hazards), and the role of humans in both increasing their occurrence and damages and how to (try to) mitigate them. Third, we will examine the interplay between humans and the surface environment, in particular climate and hydrology. Finally we will study some applications of environmental geology in society, including land use planning, waste disposal, and environmental laws and regulations.

### PHYS 105 - Meteorology

An exploration of the physical concepts involved in the weather processes of the earth. Topics will include solar radiation, the energy balance of the atmosphere, cloud formation, air masses, atmospheric disturbances, general wind circulation, weather forecasting, and weather instrumentation. Interaction of human society and weather processes will be analyzed through consideration of such topics as urban air pollution, acid rain, aircraft accidents, agriculture, the hydrologic cycle, and global weather modification.

### PHYS 221 – Environmental Physics

Controversial environmental issues revolve around complicated scientific arguments. Therefore, we need to explore the concepts of mechanics, energy, thermodynamics, electromagnetic radiation, atmospheric processes and radioactivity to clarify these issues. The understanding of the fundamental concepts of physics is crucial to the study of natural processes such as global climate, greenhouse effect, ozone depletion, pollution, etc. This course also reviews the various alternative technologies that have been developed to produce energy and analyses their impact on the environment.

## **Proposal for a Neuroscience Minor Program**

### **Program summary, objectives, and cooperative arrangements (if any)**

The Minor in Neuroscience will help our students understand how the wider neuroscience community investigates the nervous system and how it produces behavior, in the widest sense of that term. In a sense we will have our students explore the mystery of consciousness within the context of the liberal arts/interdisciplinary focus of our institution.

Students will gain an in depth understanding of the organization of the nervous system in terms of its anatomy and physiology. Topics include vertebrate anatomy and physiology, molecular structure of the neural system, primate developmental neurobiology and comparative neural anatomy and physiology. By exploring these areas of knowledge student will gain an appreciation of and fluency with multiple levels of analysis and study of the nervous system (e.g., molecular, cellular, systems, behavioral and cognitive neuroscience levels).

Students will gain a basic understanding of the interaction between neural structure and function by exploring the brain's relation to behaviors such as motor control, basic sensory processes (e.g., audition, proprioception, and vision), higher cognition (e.g., attention, memory, learning and language) and emotional processing. Major theories of brain-behavior relations will be studied. Several of these topics include behavioral neuroscience and learning, cognitive neuroscience, sensation and perception.

Students will develop fluency into multiple levels of empirical analysis and converging methodologies in the research and study of brain and behavior. The minor will allow student to gain a basic understanding of the methodology and current technology used to investigate phenomena from the molecular to complex behaviors. A critical analysis of the reliability, efficacy and validity of current methods will be employed to engage students in developing in depth knowledge of the state of primary neuroscience research on specialized and advanced neuroscience topics. Students will also have an opportunity to perform neuroscience research with faculty members.

Students will develop an understanding of the role of the brain in the behavior of atypical populations, in comparison to typical populations. In depth investigation of the assessment techniques and methods used in neuropsychological research will be presented so that students have an understanding of the typical assessment tools and procedures used for diagnosing and treating neurologically based disorders (such as dyslexia, ADD, ASD, cerebral palsy, Parkinson's disease, dementia, stroke).

Furthermore, students will also gain an appreciation of the interdisciplinary nature of neuroscience and the study of mind, brain, and behavior. Students will be encouraged to seek new insights by integrating across subject areas that have traditionally been studied separately (e.g. psychology, philosophy, public health, anthropology and art/literature). Students will explore the relation between brain, mind and behavior, and the boundaries between typical and atypical behaviors and the association between the mind, brain and conscious and unconscious behavior as presented in these areas. Students will be encouraged to use a broad ecological perspective to contextualize findings from current neuroscience research.

## Program's impact on the College's other programs:

The Neuroscience minor is designed to augment majors and will not negatively impact other programs. The minor consists of courses already offered in Psychology, Biology and Chemistry, and we believe will not require additional resources. There are students who intend to take the required courses for the minor by the time they graduate even if the minor is not offered.

## Program's need/Student demand:

### Student Survey

A request to complete a brief online survey, which included a description of the proposed neuroscience curriculum was recently sent to most of the Psychology and Biology majors. One hundred thirty-four students completed the survey.

Students were asked several questions, including:

**Q1. How would you best describe your area(s) of study? You can check or fill-in all that apply.**

#	Answer	Response	%
1	<a href="#">Psychology Major</a>	86	65%
2	<a href="#">Psychology Minor</a>	9	7%
3	<a href="#">Biology Major</a>	46	35%
4	<a href="#">Biology Minor</a>	3	2%
5	<a href="#">Other Major</a>	7	5%
6	<a href="#">Other Minor</a>	23	17%

**Q2. Which of the following courses do you think you will complete by the time you graduate, even if there is no official minor in neuroscience?**

#	Answer	Response	%
1	<a href="#">Introduction to Psychology (PSYC 101)</a>	111	85%
2	<a href="#">Introduction to Biology (BIOL 101) or Fundamentals of Biology I (BIOL 110)</a>	89	68%
3	<a href="#">Neuropsychology (PSYC 310)</a>	37	28%
4	<a href="#">Cognitive Neuroscience (PSYC 353)</a>	28	21%
5	<a href="#">Behavioral Neuroscience (PSYC 245)</a>	36	27%
6	<a href="#">Perception (PSYC 209)</a>	43	33%
7	<a href="#">Principles of Chemistry I (CHEM 115) or Bio-organic Chemistry Lec/lab (CHEM 205)</a>	32	24%
8	<a href="#">Advanced Topics in Neuroscience and Philosophy (PSYC 430)</a>	18	14%

Results: Many biology students report that they will complete Introduction to Psychology and many psychology students reported that they will complete an introductory level biology class. **Seventeen** students indicated that they will complete 5 of the required courses by the time they graduate even if the minor is not offered.

**Q3. Based on the five course requirement for the minor in Neuroscience described above, would you minor in this program if it were available?**

Results: Sixty-four students indicated that they would minor in the program if it were available.  
(Note: A small number of people checked off more than one choice for example “maybe and “yes”)

#	Answer	Response	%
1	No	30	23%
2	Maybe	42	32%
3	Yes	64	48%

A cross-tabulation of the results from Q1 and Q3 shows more detail about those who indicated “YES.” Thirty-five of those who indicate they have a major in psychology and 29 of those who indicate they have a major in biology would minor in neuroscience if the program were available.

How would you best describe your area(s) of study? You can check or fill-in all that apply.							
	Psychology Major	Psychology Minor	Biology Major	Biology Minor	Other Major	Other Minor	Total
No	26 30.95%	2 22.22%	3 6.52%	1 33.33%	3 42.86%	6 28.57%	30 22.90%
Maybe	26 30.95%	3 33.33%	16 34.78%	0 0.00%	2 28.57%	7 33.33%	42 32.06%
Yes	35 41.67%	5 55.56%	29 63.04%	2 66.67%	3 42.86%	8 38.10%	63 48.09%
Total	84 100.00%	9 100.00%	46 100.00%	3 100.00%	7 100.00%	21 100.00%	131 100.00%

Several students have communicated their interest in the minor in unsolicited personal communications, for example after receiving the request to complete the survey the following emails were received:  
(reprinted with permission)

Hi Professor Cataliotti,

I received the email asking about the proposal for a neuroscience minor. I'm currently a junior, and have already taken three of the classes that would count towards the new minor, and was planning to take one neuro class per semester while still at Ramapo. I was just wondering, if you do create the minor, do you know how soon it would be implemented? I'm excited about the possibility and would love to see a neuroscience minor here.

Thank you,  
Alison Haight

Hello,

I just wanted to say I think the proposal of a Neuro minor would be absolutely amazing! I just transferred to Ramapo from Scranton University where I was a Neuro/Psych double major. There aren't a lot of schools that offer Neuro so it would be a great addition for the school! I really hope this request goes through! I know a bunch of people would be interested, and it would increase the amount of students who apply here! I was just wondering how soon it would be implemented if it passes?

Thank you,  
Natali Taglic

### **Opportunities for further education**

The Minor in Neuroscience will provide students with the capacity to bridge connections with advanced educational opportunities in several academic and professional areas. Academically these students will be trained as critically thinking empiricists capable of analyzing data generated from work in areas as diverse as psychology, biology, cognitive science, behavioral genetics, and neurophilosophy. This background will better enable students to apply to masters and doctoral level programs in all of these and related academic areas. The Neuroscience Minor will also better prepare students to apply to schools of medicine, dentistry, and veterinary medicine, as well as behavioral science and physical therapy.

### **Alignment with the Strategic Plan:**

The minor in Neuroscience aligns with Goal 1 of the Strategic Plan, which states that minors offered at Ramapo will be one mechanism by which the College will seek to advance “*Academic Excellence and Engagement*.” The minor integrates coursework from two schools, TAS and SSHS, to provide students with an interdisciplinary study of the underlying processes motivating animal and human behavior in the realms of cognition and social-emotional behavior. This is examined in both typical and atypical populations as well as multiple contexts.

The minor also provides students with the opportunity to engage in a systematic evaluation of the role of neuroscience in influencing developments in the fields of medicine, psychology, criminology and education (amongst others). This critical examination, integration and synthesis is the hallmark of a liberal arts education.

### **Comparison with similar programs in the State and neighboring states:**

#### **Institutions in New Jersey with a Neuroscience (or similar) Major/Minor**

Drew University (BA, Neurosciences)

Rider University (BS, Biopsychology)

Rutgers University, New Brunswick (BA, Cell Biology and Neuroscience)

## **Northeast Liberal Arts Institutions with a Neuroscience Major/Minor**

Lafayette College	Muhlenberg College
Drew University	Vassar College
Smith College	Bates College
Middlebury College	Gettysburg College
Franklin and Marshall College	Haverford College
Bryn Mawr College	Washington College
St. Mary's College (COPLAC)	Trinity College
Wesleyan University	Amherst College
College of Holy Cross	Hampshire College
Stonehill College	Wellesley College
Bowdoin College	Colby College
Skidmore College	Colgate College
Hamilton College	Bucknell College
Albright College	Eastern Connecticut State, Contract Major (COPLAC)

### **Program's anticipated enrollment from launch to optimal level:**

Based on our survey results we anticipate approximately 15 students will enroll immediately and there may be 35-40 students at the optimal level.

### **Additional resources needed for the first five years:**

None

### **Program proposal form with all signatures**

(see paper copy)

### **Program proposal –documents required in addition to those provided in the Feasibility Phase**

### **Program assessment**

#### **Neuroscience Minor Learning Goals and Assessment**

1. Understand core concepts in psychology, biology and chemistry, providing the basis for scientific study of the nervous system and its relationship to behavior and mental processes.

Assessment: Exams and Quizzes: Psyc. 101, Psyc. 352, Biol.. 101 or Biol. 110, Chem 115  
Laboratory Exercises: Biol. 101 or Biol. 110, Chem 115

2. Appreciate the role of a liberal arts education to critically integrate and synthesize neuroscience within a larger cultural, social, historical and ethical framework.

Assessment: CEC in Psyc 101, 209, 352, 353, 430  
Exams: Psyc 209, Psyc 430

3. Development of proficient scientific literacy and analytical skill to critically evaluate the scientific merit of original research and scientific dissemination by popular and social media.

Assessment: Laboratory Exercises: Biol.. 101 or Biol. 110, Chem 115  
Term Paper: Psyc 352, Psyc 353, Psyc 430

4. Demonstrate effective communication about neuroscience in both written and oral form.

Assessment: CEC Psyc 352, 353, 430  
Laboratory Exercises: Biol.. 101 or Biol. 110  
Term Papers Psyc 352, Psyc 353  
Exams: Psyc 209, Psyc 352, Psyc 353, Psyc 430  
Presentations: Psyc 352, Psyc 353  
Class Discussions Psyc 430

These direct measures of assessment are currently in use for all noted courses and are inclusive in the routine program assessments of the Psychology, Biology and Chemistry. An Assessment Plan for each academic year will be submitted early in the Fall semester for review by the School Assessment Committee, College Wide Assessment Committee, the Deans of SSSH and TAS and Vice Provost for Curriculum and Assessment. The Assessment will be executed across the Fall and Spring semesters with the final report submitted to the above listed groups and individuals. Assessment reports are due late Spring.

### Alignment Program Goals to College Goals

College Goals	Neuro. Goal 1	Neuro. Goal 2	Neuro. Goal 3	Neuro. Goal 4
Interdisciplinary Analysis	x	x	x	x
Experiential learning	x	x	x	
Intercultural/International		x		
Critical Inquiry		x	x	x
Communication		x	x	x
In-depth knowledge	x		x	x
Understanding the world		x	x	x
Awareness				
Engagement				

### Program's relationship to the College's mission and Strategic Plan, and the School's mission and/or goals:

#### Program's Relationship to College's Mission:

Ramapo College's mission states that it is dedicated to providing students with a strong foundation for a lifetime of achievement and that the college is committed to academic excellence through interdisciplinary and experiential learning, and international and intercultural understanding. *Interdisciplinary* education is foundational to a minor in Neuroscience, as is a liberal education as defined by the AACU. The minor also reflects the value of *student engagement* by specifically offering course that are "characterized by critical examination, analysis, reflection, and problem solving".

**Strategic Plan:**

Goal 1 of the Strategic Plan seeks to “Advancing Academic Excellence and Engagement” through its General Education, major and free-standing minors programs. A minor in Neuroscience aligns with the strategic plan by integrating coursework from two schools, TAS and SSHS, to provide students with an interdisciplinary study of the human experience.

**School of Social Science and Human Service’s Mission:**

The minor addresses several of the goals embedded within SSHS’s mission, including *creating an interdisciplinary learning environment, using social science perspectives* to understand the study of mind, behavior and brain, and *engaging students in critical thinking about enduring and emerging issues* within the study of psychology, brain, and behavior.

**Curriculum for the Neuroscience Minor – 5 Courses Total\*****Required Courses (these should be completed first and may be prerequisites for some of the electives):**

1. Introduction to Psychology (PSYC 101)
2. Introduction to Biology (BIOL 101) or Fundamentals of Biology I (BIOL 110)

**Select at least 3 additional courses from this list:**

Neuropsychology (PSYC 310)

Cognitive Neuroscience (PSYC 353)

Behavioral Neuroscience (PSYC 352)

Perception (PSYC 209)

Principles of Chemistry I (CHEM 115) or Bio-organic Chemistry Lec/lab (CHEM 205)\*\*

Advanced Topics in Neuroscience and Philosophy (PSYC 430)\*\*

\*At least 1/2 of the courses fulfilling the minor must be distinct from the student’s major. That is, three of the five courses required for a minor cannot be used towards fulfillment of major requirements. A school core does not need to be completed for a minor. Minors are open to students regardless of school affiliation.

\*\*These courses may also be counted for the minor however they include additional prerequisites

**Course Descriptions:**

**Intro To Psychology (PSYC 101):** An introduction to psychology as a field of study and practice. The history, methods, and scope of psychology will be explored. Topics will include learning, perception, cognition, emotion, motivation, abnormal behavior, psychotherapy, social behavior, personality, development across the lifespan, and the biological bases of thought, feeling, and action.

**Prerequisites:** None



**Introduction to Biology (BIOL 101):** This course examines the development of biology as a science from the ancient world to the present. The course will examine unifying principles of biology such as genetic/evolutionary theory as central themes of modern biology. Representative organisms will be used to illustrate how organisms, using basic plans found widely in nature, are adapted to their environment. This course will emphasize biological science as a process for gaining information about the natural world using the techniques and understanding of 21st century science. Individual course sections may focus on aspects of biology such as biodiversity or human anatomy and physiology.

**Course Attributes:** GE-SCIENCE W EXPERIENTIAL

**Prerequisites:** None

**Fundamentals of Biology I Lec & Lab (BIOL 110):** An introduction to the principles of biological science. This first semester of a two-semester sequence will cover the cell from its chemical composition, structure, and function to the nature of information coding and transmission. This course also surveys the major phyla of animals, plants and fungi. Three hours of lecture and four hours of recitation/laboratory. Required for some science majors. NOTE: Dissection of plant or animal material is carried out in the laboratory portion of this course. Please refer to the Student Handbook for the College's dissection policy.

**Course Attributes:** GE-SCIENCE W EXPERIENTIAL, WRITING INTENSIVE

**Prerequisites:** Must have at least D in [CRWT 102 - CRITICAL READING & WRITING II](#) This course can be taken concurrently

**Neuropsychology (PSYC 310):** This course is designed to introduce the student to the field of clinical neuropsychology. This course will review the anatomy and basic function of the brain, particularly that of the cerebral cortex. Major neuropsychological dysfunctions related to brain damage, as well as what neurological disorders can reveal about normal brain functioning, will be presented. Students will also gain an understanding of the typical assessment tools and procedures used for diagnosing neuropsychological disorders. Fulfills Category 6. (Formerly Category 2)

**Prerequisites:** ( Must have at least D in [CRWT 102 - CRITICAL READING & WRITING II](#) This course cannot be taken concurrently AND Must have at least D in [PSYC 101 - INTRO TO PSYCHOLOGY](#) This course cannot be taken concurrently )

**Cognitive Neuroscience (PSYC 353):** This course will be concerned with how brain activity and structure support cognitive processes. We will discuss the findings of researchers who have applied advances in neuroscience to the investigation of cognition, perception, memory, language and other high level cognitive processes. There will be a focus on understanding the methods used in cognitive neuroscience. Historical and cutting-edge research will be explored. Implications within the larger context of the field of psychology will also be considered. Fulfills Category 6 requirement. (Formerly Category 3)

**Prerequisites:** ( Must have at least D in [CRWT 102 - CRITICAL READING & WRITING II](#) This course cannot be taken concurrently AND Must have at least D in [PSYC 101 - INTRO TO PSYCHOLOGY](#) This course cannot be taken concurrently )

**Behavioral Neuroscience (PSYC 352):** (FORMERLY: PSYC 245) An introduction to the biological bases of behavior. Topics will include: evolution and animal behavior; the brain and central nervous system; visual and auditory perception; and brain behavior relationships (neural regulation of hunger, sleep, consciousness, aggression, sex, and drug action). Also discussed will be ethical issues in brain control. Fulfills Category 6 requirement. (Formerly Category 3)

**Prerequisites:** Must have at least D in [PSYC 101 - INTRO TO PSYCHOLOGY](#) This course cannot be taken concurrently

**Psychology Of Perception (PSYC 209):** The study of perception is one of the oldest areas of psychological speculation and research. It raises many interesting questions about mind, reality, truth and aesthetic experience. We will approach the study of perception historically by showing how it developed in parallel within philosophy, science and art, with each approach providing important insights for the

other. Our basic question will concern the relations that exist between descriptions of the physical world, our brain, and our experience. We will investigate what modern research has to say about the ways in which we experience color, object, space, motion and event perception. Aspects of the visual arts will be discussed in this context, both as employing perceptual principles and helping to reveal them. Fulfills Category 2 requirement. (Formerly Category 3)

**Prerequisites:** Must have at least D in [PSYC 101 - INTRO TO PSYCHOLOGY](#) This course cannot be taken concurrently.

**Principles of Chemistry I Lec/lab (CHEM 115):** Principles of Chemistry is a one semester course with lecture, recitation and laboratory experiences designed for students in the allied health fields. This course introduces the fundamental concepts of general chemistry integrated with the essential features of organic and biological chemistry. Topics covered include atomic structure, the periodic table, molecular and intermolecular bonding, chemical reactions, the structure, properties and behavior of simple organic molecules, molecular features of carbohydrates, proteins and lipids. The relationship between molecular structure and macroscopic properties are emphasized. Radioactivity, its effects and uses in biological systems are briefly examined. Principles of physics are embedded in the course where appropriate. Lab Fee.

**Course Attributes:** GE-SCIENCE W EXPERIENTIAL

**Prerequisites:** None

**Bio-organic Chemistry Lec/lab (CHEM 205):** This 4-credit Lecture and Laboratory course offers a comprehensive introduction to basic modern organic chemistry. It will predominantly be of interest to students majoring in biology or bioinformatics who do not require the traditional 2-semester organic chemistry sequence. Therefore students who do not plan on applying to med-school or grad-school can take this course instead of the CHEM 210/212 sequence. This course will introduce students to the principles of organic structure and nomenclature, functional group chemistry and stereochemistry, providing the language and theoretical foundations of organic chemistry. Emphasis will be placed on the synthesis of organic molecules, including the conversion of one class or organic compound to another. In addition, the properties of these organic compounds will be discussed. Organic chemistry is a multifaceted science that is central to other related sciences including biology, biochemistry and medicinal chemistry. The middle part of the course will build on the general principles and will include details on the synthesis and reactions of alcohols, aromatic compounds, aldehydes, ketones, carboxylic acids and their derivatives and amines. In addition, the course will include sections determining structures of organic compounds using analytical techniques such as Infra-Red (IR) and NMR spectroscopy. The course will conclude with sections on carbohydrates, amino acids, proteins, lipids and nucleic acids, subjects closely related to biology and biochemistry. The co-requisite Laboratory will provide students with the required experiential component, where students will perform experiments that put into practice the ideas discussed in the Lecture. Lab Fee.

**Prerequisites:** Must have at least D in [CHEM 112 - FUND CHEM II LEC/LAB](#) This course cannot be taken concurrently

**Advanced Topics Psychology (PSYC 430): NEUROSCIENCE AND PHILOSOPHY:** Psychology, born from the disciplines of Philosophy and Physiology, has long sought to provide insight into the nature of the mind. Some of the classic questions include: What is the relationship between the mind and the body? Is the mind the same thing as the brain or is it something else? How can mere thoughts cause things to happen in a physical universe? Is it merely a delusion on our part to believe that our thoughts matter in the grand scheme of the universe? Recent progress in Neuroscience is profoundly altering our conception of how we think, feel, decide, love and even reproduce. Therefore, Neurophilosophy is a recent sub-discipline arising from the intersections of neuroscience, philosophy and psychology.

**Prerequisites:** All sections of PSYC 430 require PSYC 303/PSYC 304 as prerequisites; students must also have junior/senior academic standing.