

FORM TO REQUEST SUBSTANTIAL CHANGES TO AN EXISTING UNDERGRADUATE MINOR

A request for substantial changes to an existing program requires approval from the school director/department head (managing administrator), college academic dean, Curricular Affairs, Undergraduate Council (UGC), and College Academic Administrators Council (CAAC). Additional approvals may be required, depending on the requested changes. Complete this form and submit to Martin Marquez (martinmarquez@email.arizona.edu) no later than October 25, 2019 to be considered for inclusion in the 2020-2021 Academic Catalog.

- I. Requested by (College & School/Department):**
College of Agriculture & Life Sciences/Department of Environmental Science
- II. Proposer's name, title, email and phone number:**
Dr. Jon Chorover, Department Head, chorover@email.arizona.edu, 621-7228
- III. Minor name and number of students enrolled in the minor:**
Soil and Water Science, 0 currently enrolled

IV. Describe proposed changes to the minor. Provide a rationale and explanation for making changes to the minor and include any relevant supporting data. Are changes being made to the corresponding major (if applicable)?

Proposed changes in the Soil and Water Science minor include addition of a new soil ecology course (ENVS 300, *Soil Ecology of Sustainable Systems*), first offered in fall, 2018, to the requirements. We still require an introductory soil science course (ENVS 200, *Introduction to Soil Science*) with laboratory (ENVS 201, *Soils Laboratory*), and an introductory earth surface science course (ENVS 300, *Critical Zone Science*). We will require a course focusing on aquatic biology and water quality; students will have a choice of ENVS 442, *Limnology*; ENVS 474, *Aquatic Plants and the Environment*; ECOL 475, *Freshwater and Marine Algae*; or ENVS 477, *Principles of Ecotoxicology*.

The list of selectives, from which the remaining 4 to 5 units can be drawn, has been increased to provide greater flexibility. In addition, the required units will be reduced from 19 to 18.

The primary impetus for revising the Soil and Water Science minor is to update it to include newer and updated courses that are now available to the students, eliminate those no longer offered, to slightly reduce the credit requirements, and to provide the minor with a more focused set of courses. No corresponding changes to the Environmental Science major are being requested.

- V. Comparison Chart**—complete the chart below using your existing [academic advisement report](#). You may not need to complete all portions. Highlight row(s) indicating the proposed significant changes. You can find course information to help complete the chart below by using the [UA course catalog](#) or [UAnalytics](#) (Catalog and Schedule Dashboard> “Printable Course Descriptions by Department” On Demand Report; right side of screen). Proposed changes resulting in similar curriculum with other plans (within department, college, or university) may require completion of an additional comparison chart.

	Existing Minor Requirements	Proposed Minor Requirements
Minor name	Soil and Water Science	Soil and Water Science
CIP code—lookup here or contact Martin Marquez for assistance, if needed	01.1201, Soil Science and Agronomy, Genera	01.1201, Soil Science and Agronomy, Genera
Total units required to complete the minor	19	18

Upper -division units required to complete the minor	9	9
Total transfer units that may apply to this minor	16	15
List any special requirements to declare or gain admission to this minor (completion of specific coursework, minimum GPA to declare, workshop attendance, application, etc.)	None	None
Minor requirements. List all minor requirements including core and electives. Courses listed must include prefix, number, units, and title. Mark new coursework (New). Include any limits/restrictions in place/needed (house number limit, etc.). Provide email(s)/letter(s) of support from home department head(s) for courses being added and are not owned by your department. Recommend ordering requirements in the same order as your advisement report.	<p>ENVS 200 (3) Introduction to Soil Science</p> <p>ENVS 201 (1) Soils Laboratory</p> <p>ENVS 270 (3) Critical Zone Science</p> <p>---</p> <p>Complete 1 of the following:</p> <p>ENVS 454 (3) Water Harvesting</p> <p>GEOG 304 (3) Water, Environment, and Society</p> <p>GEOG 468 (3) Water and Sustainability</p> <p>HWRS 350 (3) Principles of Hydrology</p> <p>WSM 460A (4) Watershed Hydrology</p> <p>---</p> <p>Complete 9 units from the following:</p> <p>ENVS 300 (3) Soil Ecology of Sustainable Systems</p> <p>ENVS 305 (3) Pollution Science 3</p> <p>ENVS 316 (3) Soil Fertility and Plant Nutrition</p>	<p>ENVS 200 (3) Introduction to Soil Science</p> <p>ENVS 201 (1) Soils Laboratory</p> <p>ENVS 270 (3) Critical Zone Science</p> <p>ENVS 300 (3) Soil Ecology of Sustainable Systems</p> <p>---</p> <p>Complete 3-4 units from the following:</p> <p>ENVS 442 (4) Limnology</p> <p>ENVS 474 (4) Aquatic Plants and the Environment</p> <p>ECOL 475 (4) Freshwater and Marine Algae</p> <p>ENVS 477 (3) Principles of Ecotoxicology</p> <p>---</p> <p>Complete 3-4 units from the following. Note: 9 upper-division units required in the minor:</p> <p>ENVS 316 (3) Soil Fertility and Plant Nutrition</p>

	<p>ENVS 401 (3) Sustainable Management of Arid Lands & Salt- Affected Soils</p> <p>ENVS 420 (3) Environmental Physics</p> <p>ENVS 431R (3) Soil Genesis and Classification</p> <p>ENVS 450 (3) Green Infrastructure</p> <p>ENVS 454 (3) Water Harvesting</p> <p>ENVS 461 (3) Soil and Water Conservation</p> <p>ENVS 462 (3) Environmental Soil and Water Chemistry</p> <p>ENVS 470 (3) Soil Physics</p> <p>ENVS 482 (3) Reclamation and Redevelopment of Impacted Lands</p> <p>---</p>	<p>ENVS 330 (3) Introduction to Remote Sensing</p> <p>ENVS 340 (3) Environmental Chemistry</p> <p>ENVS 401 (3) Sustainable Management of Arid Lands & Salt-Affected Soils</p> <p>ENVS 425 (3) Environmental Microbiology</p> <p>ENVS 431R (3) Soil Genesis and Classification</p> <p>ENVS 454 (3) Water Harvesting</p> <p>ENVS 462 (3) Environmental Soil & Water Chemistry</p> <p>ENVS 470 (3) Soil Physics</p> <p>ENVS 490 (3) Remote Sensing for the Study of Planet Earth</p> <p>ENVS 442 (4) Limnology</p> <p>ENVS 474 (4) Aquatic Plants and the Environment</p> <p>ECOL 475 (4) Freshwater and Marine Algae</p> <p>ENVS 477 (3) Principles of Ecotoxicology</p> <p>GEOS 212 (3) Intro to Oceanography</p>
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Internship, practicum, applied course requirements. (Yes/No). If yes, provide description.	No	No
Senior thesis or senior project required (Yes/No). If yes, provide description.	No	No
Additional requirements (provide description)		

VI. Peer institution comparison- describe how your modified minor requirements are similar and different from minor requirements of two peer institutions. Select peers from (in order of priority) [ABOR approved institutions](#), [AAU members](#), and/or other relevant institutions recognized in the field.

The University of Maryland and The Ohio State University Soil Science minors were chosen as peer institution comparisons to the University of Arizona *Soil and Water Science* minor, recognizing that the UA minor is broader and encompasses water science as well as soil science.

The University of Maryland Soil Science minor requires 17 units, the Ohio State minor requires 15, and the UA minor 18 units. In all the minors, an introductory soil science class is compulsory. At Ohio State, students must complete an additional 11 units of soil physics, chemistry, biology, fertility, ecology, genesis and classification, soil restoration, soil contaminant behavior and management, or climate change. Similarly, University of Maryland students must complete 13 units of additional soil science courses in soil fertility, genesis and classification, physics, chemistry, microbiology, contamination and restoration, or wetland management.

The UA minor is unique in that it encompasses various aspects of water quality, behavior, and management as well as soil science. In addition to introductory soil science (ENVS 200, *Introduction to Soil Science*), all students must complete a course in soil ecology (ENVS 300, *Soil Ecology of Sustainable Systems*), a course focusing on geological and hydrological aspects of the land surface, where soils play a prominent role (ENVS 270, *Critical Zone Science*), as well as a course in water biology or chemistry. Students may select an additional selective related to soil or water chemistry, physics, quality, or management, soil science, environmental microbiology, remote sensing or geographical information systems, or geology.

VII. Faculty impact—indicate if new faculty hires will be required to deliver the proposed modified/new curriculum.

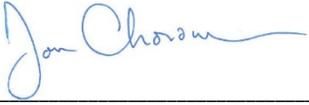
The requested changes will not require new faculty hires.

VIII. Budgetary Impact— indicate new resources needed and source of funding to implement the proposed changes. If reallocating resources, indicate where resources will be taken from and the impact this will have on students/faculty/program/unit.

No new resources will be required to implement the proposed changes. All courses included in this minor are existing courses.

IX. Required signatures

Managing unit administrator (print name and title): Dr. Jon Chorover, Head of Department of Environmental Science

Managing administrator's signature:  Date: October 29, 2019

Managing unit administrator (print name and title): _____

Managing administrator's signature: _____ Date: _____

Dean (print name): Michael Staten, Associate Dean

Dean's signature:  Date: 10/16/2019

Dean (print name): _____

Dean's signature: _____ Date: _____

Note: In some situations, signatures of more than one unit head and/or college dean may be required.

For use by Curricular Affairs:

Committee	Approval date
Academic Programs Subcommittee	
Undergraduate Council	
College Academic Administrators Council	

- Notify proposers of approval
- Upload proposal documents to relevant plan table values
- Notify ADVIP team, include proposers

If name change requested & approved:

- Create approval memo
- Send memo to college/dept and acad_org listserv
- Create new plan code
- Add last admit term to previous plan code
- Upload proposal documents to relevant plan table values
- Notify ADVIP team, include proposers

Soil & Water Science Minor

Department/School	Class	Contact	Date Sent	Response Date
Ecology & Evolutionary Biology	ECOL 475	worobey@email.arizona.edu	10/10/2019	10/10/2019
Geosciences	GEOS 212	bcarraoa@email.arizona.edu	10/10/2019	11/14/2019
	GEOS 251 GEOS 412A		11/13/2019	
Hydrology & Atmospheric Sciences	HWRS 201 HWRS 204	better@email.arizona.edu	10/10/2019	10/11/2019

MEMO

DATE: October 7, 2019

TO: Jon Chorover, Professor and Head, Environmental

FROM: Science Michael Worobey, Professor and Head,
Ecology & Evolutionary Biology

RE: Use of ECOL course in the Soil & Water Science minor curriculum

We approve the course(s) for use in the undergraduate curriculum for the **Soil & Water Science** minor, SWSMINU, as specified below:

ECOL 475 Freshwater and Marine Algae; minor selective

Managing Administrator: Michael Worobey, Professor and Head, EEB

Managing Administrator's Signature:  Date: 10/10/2019

MEMO

DATE: October 7, 2019

TO: Jon Chorover, Professor and Head, Environmental Science

FROM: Barbara Carrapa, Professor and Head,
Geosciences

RE: Use of GEOS course in the Soil & Water Science minor curriculum

We approve the course(s) for use in the undergraduate curriculum for the **Soil & Water Science** minor, SWSMINU, as specified below:

GEOS 212 Intro to Oceanography; minor selective
GEOS 251 Physical Geology; minor selective
GEOS 412A Ocean Sciences; minor selective

Managing Administrator: Barbara Carrapa, Professor and Head, Geosciences

Managing Administrator's Signature: _____ *Barbara Carrapa* _____ Date: 11/13/2019

Department of Environmental
Science



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swes.cals.arizona.edu

MEMO

DATE: October 7, 2019

TO: Jon Chorover, Professor and Head, Environmental Science

FROM: Eric Betterton, Professor and Head,
Hydrology and Atmospheric Sciences

RE: Use of HWRS course in the Soil & Water Science minor curriculum

We approve the course(s) for use in the undergraduate curriculum for the **Soil & Water Science** minor, SWSMINU, as specified below:

HWRS 201 Water Science and the Environment; minor selective
HWRS 204 Environmental Water Quality Issues; minor selective

Managing Administrator: Thomas Meixner, Professor and Head, HAS

Managing Administrator's Signature: _____



Date: _____

10/11/19