



**NEW GRADUATE CONCENTRATION PROPOSALS**  
ARIZONA STATE UNIVERSITY  
GRADUATE COLLEGE

**This form should be used for academic units wishing to propose a new concentration for existing graduate degrees.**

A concentration is a subspecialty within a degree and major. It indicates the fulfillment of a designated, specialized course of study, which qualifies the student with skills and training in one highly concentrated area of the major. Concentrations are formally-recognized educational designations (including the assignment of a university plan code for reporting/record-keeping purposes and appearance on the ASU transcript). Concentrations are distinguished from more informal academic distinctions such as “emphases,” “tracks,” “foci,” “options,” etc.

Submit the completed and signed (chairs, unit deans) proposal to the **Office of Graduate Academic Programs**, mail code 1003 and electronic copies to [eric.wertheimer@asu.edu](mailto:eric.wertheimer@asu.edu) or [amanda.morales-calderon@asu.edu](mailto:amanda.morales-calderon@asu.edu).

**Please type.**

<b>Contact Name(s):</b> Larry Olson	<b>Contact Phone(s):</b> 480-727-1499
<b>College/School/Division Name:</b> Fulton Schools of Engineering	
<b>Academic Unit Name:</b> The Polytechnic School, Environmental & Resource Management (or proposing faculty group for interdisciplinary proposals)	
<b>Existing Graduate Degree and Major under which this concentration will be established:</b> M.S. in Environmental & Resource Management	
<b>Proposed Concentration Name:</b> Water Management	
<b>Requested Effective Term and Year:</b> Fall 2017	
<b>Do Not Fill in this information: <u>Office Use</u></b> <b><u>Only Plan Code:</u></b>	<b>CIP Code:</b>

**1. Overview**

**A. Provide a brief description (*not to exceed 150 words*) of the new concentration (*including the focus of the new concentration, relationship to other concentrations within this degree program, etc.*).**

The M.S. in Environmental and Resource Management degree provides students with a background in the sciences, engineering, environmental sciences and other related disciplines with the regulatory and technical background needed to mitigate the environmental impact of industrial sources of pollution, ensure compliance with environmental regulations, and manage and preserve natural ecosystems. The concentration in Water Management will focus on issues of water quality, supply, conservation, and augmentation strategies. It will be of interest to those who work in municipal, state, federal, and tribal water and environmental agencies, water providers to urban and agricultural users, manufacturing and mining industries, as well as those interested in sustainable development in this country and around the world. The curriculum will build on the M.S. in Environmental and Resource Management coursework together with applicable courses from other related ASU programs.

**2. Impact Assessment**

**A. Explain the unit’s need for the new concentration (*e.g., market demand, research base, direction of the discipline, and interdisciplinary considerations*). How will the new concentration complement the existing degree program, including enrollment, national ranking, etc.?**

More than 2 billion people live in drylands which represent 44% of the world's cultivated lands and support 50% of the world's livestock. In the arid western U.S. and in many other places around the world, the issue of access to potable water is becoming ever more critical. The proposed Water Management concentration provides a focused approach to issues of water supply, watershed management, management of groundwater and surface water, water and wastewater treatment,

and innovative water reuse and augmentation strategies. Throughout the curriculum, the complex history of water law and policies will be emphasized. Input from water professionals outside of the university will be sought to ensure that the program is preparing students with the skills and knowledge that are critically needed to meet some of our greatest future challenges. The concentration is technically based but the goal is to prepare leaders who can effectively manage water resources, communicate policy options, and assume strategic positions of leadership within their organizations. A coherent degree option in Water Management as part of an Environmental Management degree will help attract a new type of student to the M.S. in Environmental and Resource Management and will enhance the scope and reputation of the program.

This concentration is aimed at people who wish to work in the water field either in industry, agriculture, utilities, government, or policy oriented organizations. The existing MS in Environmental and Resource Management degree is focused more on hazardous material and comprehensive environmental management. This concentration will attract a new group of students who want a more in depth focus on water than what we have been able to provide previously.

There are other programs in the country that are similar to this, but we have some unique attributes in that we focus on the technical (Water/Wastewater Treatment, Soils and Groundwater), complex water regulations (Environmental/Resources Regulations, Water Law and Policy), and human health impacts of pollution (Toxicology). Depending upon which electives a student takes he/she can explore science (Algae, Hydrology, Environmental Chemistry, Watershed Management) or policy oriented subjects (Sustainability, Water Resource Management, Economics of Environmental Planning, Tribal Environmental & Resource Management, International Environmental Management, International Environmental Law and Policy) more fully.

In addition, there is an existing undergraduate degree in BS in Environmental and Resource Management that should attract graduates to the master's program if proposed as an accelerated degree program in the future.

**B. Please identify other related ASU programs and describe how the new concentration will complement these existing ASU programs? (If applicable, statements of support from affected academic unit administrators should be included with this proposal submission.)**

The following ASU programs have course offerings in areas that are related to the proposed concentrations and there may be students in the new program that have an interest in pursuing electives from the programs below. The new Water Management concentration will focus more on water quality and sustainable development of water resources. This offering will be unique to the MS Environmental & Resource Management program.

Kyl Center for Water Policy  
FutureH2O  
Decision Center for a Desert City  
MS Sustainability  
Civil, Environmental and Sustainable Engineering (MSE)  
Global Technology and Development, MS  
Applied Biological Sciences, MS

**C. Is this an interdisciplinary concentration? If yes, please address the relationship of the proposed concentration to other existing degree programs and any parallel or similar concentrations in those degree programs. (Please include relevant Memoranda of Understanding regarding this interdisciplinary concentration from all applicable academic units.)**

The concentration is not a formal interdisciplinary program, but courses from a wide variety of other programs may be used as electives (see Attachment A).

### 3. Academic Requirements and Curriculum

**A. What are the total minimum hours required for the major and degree under which the proposed concentration will be established?**

The M.S. in Environmental and Resource Management requires 30 hours.

**B. Please provide the admissions criteria for the proposed concentration. If they are identical to the admission criteria for the existing major and degree program under which this concentration will be established, you may attach a copy of these criteria as they appear on the departmental website, or other source (please indicate source). Please also list all undergraduate and graduate degrees and/or related disciplines that are required for admission to this concentration program.**

**Degree(s):** Minimum of a bachelor's degrees in the sciences (biology, chemistry, etc.), engineering, environmental sciences, ecology, environmental policy, or related fields from a regionally accredited college or university, or international equivalent.

**GPA:** Minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in the last 60 hours of a student's first bachelor's degree program, or a minimum of 3.00 cumulative GPA (scale is 4.00 = "A") in an applicable master's degree.

**English Proficiency Requirement for International Applicants:** (See Graduate College policies and procedures) ([http://graduate.asu.edu/admissions/international/english\\_proficiency](http://graduate.asu.edu/admissions/international/english_proficiency)):

Same as Graduate College policy.

**Required Admission Examination:**  GRE  GMAT  Millers Analogies  None required

**Additional Materials:** Resume, personal statement, letters of recommendation

- C. If the proposed concentration is part of a larger, interdisciplinary agenda, please provide additional admission information related to students who may enter with various academic backgrounds, including expected entry-level competencies. As applicable, please also address the courses that must be taken to remedy any relevant deficiencies for incoming students.**

The proposed concentration is not part of a larger, interdisciplinary agenda

- D. What knowledge, competencies, and skills (learning outcomes) should graduates have when they complete this proposed concentration program? Examples of program learning outcomes can be found at (<https://uoeee.asu.edu/program-outcomes>).**

Students graduating with the Water Management concentration will be able to:

- Examine the regulatory structure and explore how historical water policy decisions affect current management options
- Compare and contrast the technical and economic options for water and wastewater treatment
- Compare and contrast the basic hydrological principles and the impact of watershed management on water quantity and quality
- Examine the broader societal impacts of how water resources are managed including impacts on agriculture, development of urban areas in water stressed regions, and the impact of climate change.

- E. How will students be assessed and evaluated in achieving the knowledge, competencies, and skills outlined in 3.D. above? Examples of assessment methods can be found at (<http://www.asu.edu/oue/assessment.html>).**

**Outcome 1:** Examine the regulatory structure and explore how historical water policy decisions affect current management options.

**Assessment:**

- Students in ERM 535 Water Law and Policy will write a paper on historical water policies that document how our current water law has evolved. At least 85% of students will receive a grade of B or better.
- Students completing a thesis (ERM 599) or applied project (ERM 593) will demonstrate through their oral defense that they can trace the evolution of their particular topic through historical water law and policy decisions. At least 95% of students will successfully defend their thesis or applied project.
- Students taking the written Comprehensive Exam will successfully answer questions that require them to trace the evolution of current water laws and policies. At least 85% of students will pass the written Comprehensive Exam.

**Outcome 2:** Compare and contrast the technical and economic options for water and wastewater treatment

**Assessment:**

- Students in ERM 533 Water/Wastewater Treatment Technologies will demonstrate both technical and economic knowledge of various water treatment options through exams and required written papers. At least 85% of students will receive an average grade of B or better on these assignments.
- Students in ERM 523 Soils and Groundwater Contamination will demonstrate technical and economic knowledge of various options for treating contaminated groundwater through exams and required written papers. At least 85% of students will receive an average grade of B or better on these assignments.
- Students in ERM 535 Water Law and Policy will demonstrate their knowledge of technical, economic and social acceptance issues associated with reuse of wastewater through exams, class discussion, and student presentations. At least 85% of students will receive an average grade of B or better on these assignments.

**Outcome 3:** Compare and contrast the basic hydrological principles and the impact of watershed management on water quantity and quality.

**Assessment:**

- Students in ERM 523 Soils and Groundwater Contamination will demonstrate their understanding of hydrological principles through exams and homework assignments. At least 85% of students will receive an average grade of B or better on these assignments.
- Students in ERM 535 Water Law and Policy will demonstrate their understanding of how watersheds affect both the quantity and quality of water generated from precipitation through exams, class discussions, and written assignments. At least 85% of students will receive an average grade of B or better on these assignments.
- Students in ERM 502 Regulatory Framework for Toxic and Hazardous Substances will demonstrate their knowledge of legal requirements to protect watersheds through exams. At least 85% of students will receive an average grade of B or better on these assignments.

**Outcome 4:** Examine the broader societal impacts of how water resources are managed including impacts on agriculture, development of urban areas in water stressed regions, and the impact of climate change.

**Assessment:**

- Students will develop a portfolio of papers, oral presentations and group projects completed as part of this degree program that describe and analyze the effects of specific examples of the impact of water policy and climate change on water stressed urban areas or agriculture. These papers, presentations and projects will be requirements in a number of different courses and will be graded by the instructors for each course. The compilation of this work on the impact of water policy decisions will highlight the depth and sophistication of each student's understanding of the complexity of water resources management issues. At least 90% of students will have achieved a grade of B or better on the work included in this portfolio.
- Students completing a thesis (ERM 599) or applied project (ERM 593) will be able in their oral defense to describe and analyze the effects of specific examples of the impact of water policy and climate change on water stressed urban areas or agriculture. At least 95% of students will successfully defend their thesis or applied project.
- Students taking the written Comprehensive Exam will successfully answer questions that require them to describe and analyze the effects of specific examples of the impact of water policy and climate change on water stressed urban areas or agriculture. At least 85% of students will pass the written Comprehensive Exam.

**F. Please provide the curricular structure for the proposed concentration.**

- Additionally, please ensure that all **new** required course proposals have been submitted to the Provost's office through the Curriculum ChangeMaker online course proposal submission system for approval before this concentration is put on the University Graduate Council and CAPC agendas.

<b>Required Core Courses for the Degree</b>			<b>Credit Hours</b>
<i>(Prefix &amp; Number)</i>	<i>(Course Title)</i>	<i>(New Course?) Yes or No?</i>	<i>(Insert Section Sub-total)</i>
			<b>9</b>
ERM 502	Regulatory Framework for Toxic & Hazardous Substances	N	3
		N	

ERM 503	Principles of Toxicology	N	3
ERM 506	Chemistry of Hazardous Materials	N	3
<b><u>Required Concentration Courses</u></b>			<b><u>Credit Hours</u></b>
<i>(Prefix &amp; Number)</i>	<i>(Course Title)</i>	<i>(New Course?) Yes or No?</i>	(Insert Section Sub-total) <b>9 hrs</b>
ERM 523	Soils and Groundwater Contamination	N	3
ERM 533	Water/Wastewater Treatment Technologies	N	3
ERM 535	Water Law and Policy	Y	<b>3</b>

<b><u>Elective or Research Courses</u></b> <i>(as deemed necessary by supervisory committee)</i>			<b><u>Credit Hours</u></b>
<i>(Prefix &amp; Number)</i>	<i>(Course Title)</i>	<i>(New Course?) Yes or No?</i>	(Insert Section Sub-total) <b>6, 9, or 12 hrs</b>
	Approved Electives (see Attachment A). Other courses may be used with approval from the academic unit	N	
	<ul style="list-style-type: none"> <li>•6 hours of electives needed if a student chooses a thesis</li> <li>•9 hours of electives needed if a student chooses an Applied Project</li> <li>•12 hours of electives needed if a student chooses a written comprehensive exam</li> </ul>		
<b><u>Culminating Experience</u></b> <i>E.g. - Capstone project, applied project, <b><u>thesis (masters only)</u></b> – 6 credit hours) or <b><u>dissertation (doctoral only)</u></b>– 12 credit hours) as applicable</i>			<b><u>Credit Hours</u></b> (Insert Section Sub-total)
ERM 599 Thesis			6
ERM 593 Applied Project			3
Or Written Comprehensive Exam			0
<b>Total required credit hours</b>			<b>30</b>

G. Please describe the primary course delivery mode, (e.g., online, face-to-face, off-site etc.). **Please note:** If this proposed initiative will be offered **completely** online, clearly state that in this section, and fill out the applicable section in the Operational Appendix.

Face-to-Face and iCourse combination

H. Please describe the culminating experience(s) required for completion of the existing degree and major, and the proposed concentration (e.g., thesis, dissertation, comprehensive exams, capstone course(s),

*practicum, applied projects, etc.*).

The M.S. in Environmental and Resource Management program has three options:

- Thesis option. Traditional thesis written document with oral defense adhering to Graduate College requirements. Most thesis will be laboratory based, although some may have a policy orientation.
- Applied Project: 3 hrs of credit vs 6 hrs for a thesis means the Applied Project has a more narrow focus and would require less time than a thesis. Written document and defense required.
- Written comprehensive exam: Typically taken in final semester. Focuses on synthesizing key concepts, demonstrating a mature understanding of issues, and applications to real world problems. This is an essay exam with typically about 10 questions.

The concentration in Water Management will have the same options

**I. Please describe any other requirements for completion of the existing degree and major, and the proposed concentration (e.g., internships, foreign language skills, etc.).**

No foreign language requirement; students may use internship hours as elective credit, but it is not required.

**J. For interdisciplinary programs, additional sample curricular structures must be included as appendix items to this proposal relating to students with various academic backgrounds who may pursue the proposed concentration, including expected mastery of core competencies (e.g., course work, skills, and/or knowledge).**

This is not a formal interdisciplinary program, but students who meet pre-requisite requirements may use coursework from other ASU programs (see Attachment A).

#### 4. Administration and Resources

**A. How will the proposed concentration be administered (including recommendations for admissions, student advisement, retention etc.)? Describe the administering body in detail, especially if the proposed concentration is part of a larger interdisciplinary initiative. How will the graduate support staffing needs for this proposed concentration program be met?**

The proposed concentration in Water Management will be administered in the same manner as the M.S. in Environmental and Resource Management program. Students must submit an application, personal statement, resume, and letters of recommendation, GRE, and transcripts. Foreign students must also meet the Graduate College English Proficiency requirements. The Program Chair, in consultation with Environmental and Resource Management faculty, makes a recommendation for admission followed by the recommendation of the Director of the Polytechnic School. Student advisement and retention issues are handled by Amy Wolsey, Graduate Student Advisor at the Polytechnic School and the Environmental and Resource Management Program Chair. Adequate staffing and faculty resources are available for this concentration.

**B. How many students will be admitted immediately following final approval of the concentration? What are enrollment projections for the next three years?**

2017-18 10 students  
2018-19 25 students  
2019-20 50 students

**C. What are the resource implications for the proposed concentration, including any projected budget needs? Will new books, library holdings, equipment, laboratory space and/or personnel be required now or in the future? If multiple units/programs will collaborate in offering this concentration, please discuss the resource contribution of each participating program. Letters of support must be included from all academic units that will commit resources to this concentration.**

No new equipment or laboratory space is required to initiate this concentration. An additional Faculty Associate for one

course per semester will be required, but otherwise existing faculty resources are sufficient. There is a current search approved for a tenure track faculty in the MS in Environmental and Resource Management program in the algae/food/water/energy nexus. This person will be an important addition for the Water Resources Management concentration. The addition of a new tenure track faculty will reduce the current number of Faculty Associates, so there should be no net increase needed. The Faculty Associate need referred to here would be for specialty courses such as Water Law. As the program grows, it is anticipated that a new faculty line will be requested. Students will have the option of taking elective courses from a number of other units at ASU, but no resources from other academic units are required.

**D. Please list the primary faculty participants in this proposed concentration.**

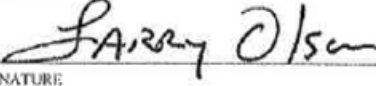
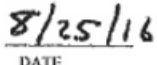
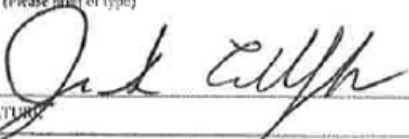

<i>Name</i>	<i>Title</i>	<i>Area(s) of Specialization as they relate to proposed concentration</i>
Larry Olson	Program Chair, Environmental and Resource Management; Associate Professor	Environmental chemistry; water treatment and augmentation strategies; environmental management in developing world
Kiril Hristovski	Associate Professor Engineering	Applications of nanotechnology in water treatment; emerging contaminants; environmental challenges in developing world
Albert Brown	Senior Lecturer, Environmental and Resource Management	Environmental management; regulatory structure; water quality and emerging contaminants; environmental health
Milton Sommerfeld	Professor, Environmental and Resource Management	Director of Laboratory for Algae Research and Biotechnology; aquatic ecology; water treatment; algae/food/water/energy nexus

**5. Additional Material** — Please attach any additional information that you feel relates to the proposed concentration. (Please label accordingly, i.e., Appendix or Attachment A, B, etc.)

Attachment A

List of initial elective courses for the Water Resources Management concentration. Additional courses may be added to this list in the future.

- ERM 584 Internship (3)
- ERM 520 Sustainability and Sustainable Development (3)
- ERM 528 International Environmental Management (3)
- ERM 540 International Environmental Law and Policy (3)
- ERM 598 Topic: Water Resource Management (3)
- ERM 598 Topic: Environmental Chemistry (3)
- ERM 598 Topic: Algae in Water/Energy/Food Nexus (3)
- ERM 598 Topic: Utilizing Algae Technology for Diverse Products (3)
- ERM 598 Topic: Tribal Environmental & Natural Resources Management (3)
- ABS 586 Remote Sensing in Environmental Resources (4)
- ABS 430 Watershed Management (3)
- CEE 545 Hydrology (3)
- SOS 533 Sustainable Water (3)
- PUP 541 Economics of Environmental Planning (3)

Approvals (if the proposal submission involves multiple units, please include letters of support from those units)	
DEPARTMENT CHAIR or SCHOOL DIRECTOR   SIGNATURE	    DATE
DEAN (Please print or type)   SIGNATURE	    DATE

The following section will be completed by Graduate College following the recommendations of faculty governance bodies.

DEAN, GRADUATE COLLEGE	
   SIGNATURE	   DATE

**Please note:** Proposals for new concentrations also require the review and recommendation of approval from the University Graduate Council, Curriculum and Academic Programs Committee (CAPC), the Academic Senate (Information item only), and the Office of the Provost before they can be put into operation.

**The final approval notification will come from the Office of the Provost.**

GF1112E-92



APPENDIX I

OPERATIONAL INFORMATION FOR GRADUATE PROGRAMS

(This information is used to populate the [Graduate Programs Search](#)/catalog website.)

1. **Provide a brief** (catalog type - no more than 150 words) **program description.**

The MS in environmental and resource management degree provides students with a background in the sciences, engineering, environmental sciences and other related disciplines with the regulatory and technical background needed to mitigate the environmental impact of industrial sources of pollution, ensure compliance with environmental regulations, and manage and preserve natural ecosystems. The concentration in water management will focus on issues of water quality, supply, conservation, and augmentation strategies. This program will be of interest to those who work in municipal, state, federal, and tribal water and environmental agencies, water providers to urban and agricultural users, manufacturing and mining industries, as well as those interested in sustainable development in this country and around the world.

**Breakdown of requirements for the academic catalog:**

**Required Core (9 credit hours)**

ERM 502 Regulatory Framework for Toxic & Hazardous Substances (3)  
ERM 503 Principles of Toxicology (3)  
ERM 506 Chemistry of Hazardous Materials (3)

**Concentration (9 credit hours)**

ERM 523 Soils and Groundwater Contamination (3)  
ERM 533 Water/Wastewater Treatment Technologies (3)  
ERM 535 Water Law and Policy (3)

**Electives or Research (6-12 credit hours)**

**Culminating Experience (0-6 credit hours)**

ERM 593 Applied Project (3)  
ERM 599 Thesis (6)  
Written Comprehensive Exam (0)

**Additional Curriculum Information**

Students choose one of the culminating experiences listed above. Thesis students will take six credit hours of electives and research; applied project students take nine credit hours of electives and research; and written comprehensive exam students take twelve credit hours of electives and research.

Please see the academic unit for the approved course list for electives or research. Other coursework may be used with the approval of the academic unit.

The thesis and applied project options will have an oral defense.

2. **Contact and Support Information:**

<b>Office Location (Building &amp; Room):</b> TECH, Room 137, Polytechnic Campus	<b>Campus mail code:</b> 4280
<b>Campus Telephone Number:</b> 480-727-1825	<b>Program Director (Name and *ASU ID):</b> Larry Olson, larolson
<b>Program email address:</b> <a href="mailto:erm@asu.edu">erm@asu.edu</a>	<b>Program Support Staff (Name and *ASU ID):</b> Denise Kolisar, dkolisar
<b>Program website address:</b> <a href="http://poly.engineering.asu.edu/erm/">http://poly.engineering.asu.edu/erm/</a>	<b>Admissions Contact (Name and *ASU ID):</b> Amy Wolsey, awolsey

3. **Campus(es) where program will be offered:**

\* **To select desired box**, place cursor on the left side of the box, right click mouse, select **Properties**, under **Default Value** select **Checked**, press **OK** and the desired box will be checked.

**ASU Online only (all courses online)** – (Office of the Provost and ASU Online approval is needed)

**All other campus options (please select all that apply):**

Downtown  Polytechnic

Tempe  West

**Both on-campus and**  **ASU Online (\*)** – Office of the Provost and ASU Online approval is needed for this option. (Check applicable campus from options listed).

4. **Application and iPOS Recommendations:** List the Faculty and Staff that will input admission/POS recommendations to Gportal **and** indicate their approval for Admissions and/or POS:

Name	ADMSN	POS
Larry Olson	X	X
Amy Wolsey	X	X

5. **Keywords:** (List all keywords that could be used to search for this program. Keywords should be specific to the proposed program.)

Water Management  
Water Resources  
Water Quality  
Water Law  
Water Supply  
Water Augmentation  
Water Reuse

6. **Area(s) of Interest:**

\* **To select desired box**, place cursor on the left side of the box, right click mouse, select **Properties**, under **Default Value** select **Checked**, press **OK** and the desired box will be checked

A. Select **one (1)** primary area of interest from the list below that applies to this program.

- [Architecture & Construction](#)
- [Arts](#)
- [Business](#)
- [Communication & Media](#)
- [Education & Teaching](#)
- [Engineering & Technology](#)
- [Entrepreneurship](#)
- [Health & Wellness](#)
- [Humanities](#)

- [Interdisciplinary Studies](#)
- [Law & Justice](#)
- [Mathematics](#)
- [Psychology](#)
- [STEM](#)
- [Science](#)
- [Social and Behavioral Sciences](#)
- [Sustainability](#)

B. Select **one (1)** secondary area of interest from the list below that applies to this program.

- [Architecture & Construction](#)
- [Arts](#)
- [Business](#)
- [Communications & Media](#)
- [Education & Teaching](#)
- [Engineering & Technology](#)
- [Entrepreneurship](#)
- [Health & Wellness](#)
- [Humanities](#)

- [Interdisciplinary Studies](#)
- [Law & Justice](#)
- [Mathematics](#)
- [Psychology](#)
- [STEM](#)
- [Science](#)
- [Social and Behavioral Sciences](#)
- [Sustainability](#)

**(NEW GRADUATE INITIATIVES)**

**PROPOSAL PROCEDURES CHECKLIST**

Academic units should adhere to the following procedures when requesting new curricular initiatives (degrees, concentrations or certificates).

**Obtain the required approval from the Office of the Provost to move the initiative forward for internal ASU governance reviews/approvals.**

- Establishment of new curricular initiative requests; degrees, concentrations, or certificates
- Rename requests; existing degrees, concentrations or certificates
- Disestablishment requests; existing degrees, concentrations or certificates

**Submit any new courses that will be required for the new curricular program to the Curriculum ChangeMaker online course approval system for review and approval.**

- Additional information can be found at the Provost's Office Curriculum Development website: [Courses link](#)
- For questions regarding proposing new courses, send an email to: [courses@asu.edu](mailto:courses@asu.edu)

**Prepare the applicable proposal template and operational appendix for the proposed initiative.**

- New degree, concentration and certificate templates (contain proposal template and operational appendix) can be found at the Provost's Office Curriculum Development website: [Academic Programs link](#)

**Obtain letters or memos of support or collaboration. (if applicable)**

- When resources (faculty or courses) from another academic unit will be utilized
- When other academic units may be impacted by the proposed program request

**Obtain the internal reviews/approvals of the academic unit.**

- Internal faculty governance review committee(s)
- Academic unit head (e.g. Department Chair or School Director)
- Academic unit Dean (will submit approved proposal to the [curriculumplanning@asu.edu](mailto:curriculumplanning@asu.edu) email account for further ASU internal governance reviews (as applicable, University Graduate Council, CAPC and Senate)

**Additional Recommendations** - All new graduate programs require specific processes and procedures to maintain a successful degree program. Below are items that Graduate College strongly recommends that academic units establish after the program is approved for implementation.

**Set-up a Graduate Faculty Roster for new PhD Programs** – This roster will include the faculty eligible to mentor, co-chair or chair dissertations. For more information, please go to [http://graduate.asu.edu/graduate\\_faculty\\_initiative](http://graduate.asu.edu/graduate_faculty_initiative).

**Establish Satisfactory Academic Progress Policies, Processes and Guidelines** – Check within the proposing academic unit and/or college to see if there are existing academic progress policies and processes in place. If none have been established, please go to [http://graduate.asu.edu/faculty\\_staff/policies](http://graduate.asu.edu/faculty_staff/policies) and scroll down to the **academic progress review and remediation processes** (for faculty and staff) section to locate the reference tool and samples for establishing these procedures.

**Establish a Graduate Student Handbook for the New Degree Program** – Students need to know the specific requirements and milestones they must meet throughout their degree program. A Graduate Student Handbook provided to students when they are admitted to the degree program and published on the website for the new degree gives students this information. Include in the handbook the unit/college satisfactory academic progress policies, current degree program requirements (outlined in the approved proposal) and provide a link to the Graduate Policies and Procedures website. Please go to [http://graduate.asu.edu/faculty\\_staff/policies](http://graduate.asu.edu/faculty_staff/policies) to access Graduate Policies and Procedures.

**APPENDIX II**

**Support Letters**

**Ira A. Fulton Schools of Engineering – Official Submission**

**From:** Sergio Quiros  
**Sent:** Monday, October 03, 2016 3:25 PM  
**To:** Curriculum Planning  
**Cc:** Amanda Morales-Calderon; Jeremy Helm; Cindy Boglin  
**Subject:** RE: M.S. in Environmental & Resource Management (Water Resources Management)

Attached are the revised documents.

Thank you,

*Sergio G. Quiros*

Specialist Senior, Academic and Student Affairs  
Ira A. Fulton Schools of Engineering  
Arizona State University  
Tempe, AZ 85287-8109  
Phone: 480/727-5770  
Email: [Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)

**From:** Sergio Quiros  
**Sent:** Monday, October 03, 2016 11:18 AM  
**To:** Curriculum Planning  
**Cc:** Cindy Boglin; Jeremy Helm  
**Subject:** FW: M.S. in Environmental & Resource Management (Water Resources Management)

Hello,

Attached please find the following proposal for your review:

**Ira A. Fulton Schools of Engineering**  
*The Polytechnic School*  
Establishment of a graduate concentration  
M.S. in Environmental & Resource Management (Water Resources Management)

Thank you,

*Sergio G. Quiros*

Specialist Senior, Academic and Student Affairs  
Ira A. Fulton Schools of Engineering  
Arizona State University  
Tempe, AZ 85287-8109  
Phone: 480/727-5770  
Email: [Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)

School of Life Science Faculty – Support Letter

**From:** Larry Olson  
**Sent:** Monday, August 22, 2016 2:29 PM  
**To:** Cindy Boglin <[Cindy.Boglin@asu.edu](mailto:Cindy.Boglin@asu.edu)>  
**Subject:** FW: Concentration in Water Management

Cindy:  
Here is a letter of support for the Water Management Concentration. Thanks,  
Larry

**From:** John Sabo  
**Sent:** Monday, August 22, 2016 2:25 PM  
**To:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Subject:** RE: Concentration in Water Management

To whom it may concern,

I am writing this letter in support of Larry Olson's proposal to create a new concentration in Water Management as a part of the M.S. in Environmental & Resource Management degree. I am launching a new research initiative in ASU under the KED umbrella called Future H2O. This initiative was committed at the March 22 White House Water Summit and as part of that commitment we proposed to train 1000 new water leaders by 2025. I see Larry's efforts as central to achieving this ambitious goal and I commit to supporting and parallelizing efforts between this MS Concentration and Future H2O.

All the best

John Sabo

**From:** Larry Olson  
**Sent:** Monday, August 22, 2016 1:54 PM  
**To:** John Sabo <[John.L.Sabo@asu.edu](mailto:John.L.Sabo@asu.edu)>  
**Subject:** Concentration in Water Management

Dear Professor Sabo:

I'm writing to ask for a letter of support from you for a proposed new concentration in Water Management as a part of our M.S. in Environmental & Resource Management degree. I've attached the Concentration Proposal to this email. I've been working with Sarah Porter of the Kyl Center, the Morrison School of Agribusiness, and others in trying to put this together.

As you can see, the M.S. in ERM is a 30 semester hour degree and the proposed concentration would be 18 hours. We are proposing using three of our existing ERM courses as a core (ERM 523 Soils and Groundwater Contamination; ERM 527 or 502 Environmental Law courses (taught mostly by practicing local attorneys); and ERM 533 Water and Wastewater Treatment Technologies. The required elective courses would consist of a new course ERM 535 Water Law and Policy and two additional courses taken from a list of approved electives that would be drawn from several other departments. This list can be expanded in the future.

This master's degree and concentration would be attractive to students from a variety of undergraduate disciplines who are interested in various aspects of water including water policy, water law, management of ground and surface water, and innovative technologies for water treatment and augmentation strategies. Our existing master's students come from engineering, biology, chemistry, geology, environmental science, industrial hygiene, sustainability and other related disciplines.

I would be glad to meet with you at your convenience if you would like to discuss it further. There is a short time fuse for letters to be collected and if it is possible to write a brief email this week, I would be very grateful.

Thanks for your consideration,  
Larry Olson

Larry Olson, Ph.D.  
Associate Professor  
Program Chair, Environmental & Resource Management  
The Polytechnic School  
Ira A. Fulton Schools of Engineering  
Arizona State University  
480-727-1499  
[Larry.Olson@asu.edu](mailto:Larry.Olson@asu.edu)

College of Integrative Sciences and Arts - Support Letter

**From:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Date:** August 24, 2016 at 7:58:36 AM MST  
**To:** Cindy Boglin <[Cindy.Boglin@asu.edu](mailto:Cindy.Boglin@asu.edu)>  
**Subject:** FW: Water concentration

**From:** Chris Martin  
**Sent:** Monday, August 22, 2016 2:31 PM  
**To:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Subject:** RE: Water concentration

Larry,

This is not a problem. We would support this.

Chris

Chris A. Martin, Ph.D.,  
Professor and Faculty Head  
Honors Faculty  
Science and Mathematics Faculty  
College of Integrative Sciences and Arts  
Arizona State University  
<http://www.public.asu.edu/~camartin/>

**From:** Larry Olson  
**Sent:** Wednesday, August 17, 2016 2:12 PM  
**To:** Chris Martin <[Chris.Martin@asu.edu](mailto:Chris.Martin@asu.edu)>  
**Subject:** Water concentration

Hi Chris:

The Environmental & Resource Management program would like to add a concentration in Water Management to our M.S. in ERM. I've attached the proposal above. We would like to utilize two of your courses as Concentration Electives: ABS 586 Remote Sensing in Environmental Resources and ABS 430 Watershed Management. Would that be OK with you? There may be additional ABS classes we could utilize in the future if you are amenable.

Would it be possible to have an email response that would indicate your support for this proposal? I'd be glad to come by and talk if you have some time.

Thanks for your help.

Larry



Center for Water Policy - Support Letter

**From:** Sarah Porter  
**Sent:** Tuesday, August 23, 2016 10:37 PM  
**To:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Subject:** RE: Water concentration

Hi, Larry.

I apologize for my delay in getting back to you. The proposal is excellent and we wholeheartedly support the establishment of the Water Management concentration as it will provide students with knowledge and skills that are increasingly important as new demands and challenges with respect to water supply.

Please let me know how I can help with this.

Sarah

**Sarah Porter**  
Director, Kyl Center for Water Policy  
Morrison Institute for Public Policy  
Arizona State University  
411 N Central Ave, Ste 900  
Phoenix AZ 85004-0692  
o: 602-496-0586  
c: 602-828-0866

**From:** Larry Olson  
**Sent:** Wednesday, August 17, 2016 2:24 PM  
**To:** Sarah Porter <[s.porter@asu.edu](mailto:s.porter@asu.edu)>  
**Subject:** FW: Water concentration

Hi Sarah:

Thanks for taking the time to meet with me earlier this summer. As we discussed, the Environmental & Resource Management program would like to add a concentration in Water Management to our M.S. in ERM. I've attached the proposal above.

Would it be possible to have a response to this email that would indicate your support for this new concentration? That would be important as we move through the curriculum approval process. We hope that the students in this program can be a valuable resource to the Kyl Center in the future.

Thanks,  
Larry

Larry Olson, Ph.D.  
Associate Professor  
Program Chair, Environmental & Resource Management  
The Polytechnic School  
Ira A. Fulton Schools of Engineering  
Arizona State University

**Morrison School of Agribusiness - Support Letter**



Morrison School of Agribusiness  
7231 E. Sonoran Arroyo Mall, #230  
Mesa, AZ 85212-6414  
p: 480-727-1586  
f: 480-727-1961  
web: wpcarey.asu.edu

August 24, 2016

Dear Larry,

The Morrison School of Agribusiness, and the W. P. Carey School of Business, is supportive of the proposed concentration in Water Resources Management for the M.S. in Environmental and Resource Management (ERM) degree offered by the Polytechnic School, Fulton Schools of Engineering.

This proposed M.S. concentration is likely to be of interest to undergraduate students majoring in agribusiness (BA Business – Global Agribusiness) who desire an advanced degree. This is particularly true of agribusiness students who are interested in the sciences, or students who come from a production agriculture background, that maintain deep interests in water management issues. The proposed concentration in Water Resources Management will also help in the marketing efforts of the accelerated M.S. 4+1 (BA Business – Global Agribusiness to M.S. in ER&M) offered by the Morrison School of Agribusiness, W. P. Carey School of Business, and the Polytechnic School.

Again, I am very supportive of this effort. Please let me know if there is any way that I can assist.

Sincerely,

A handwritten signature in cursive script that reads "Mark R. Manfredi".

Mark R. Manfredi  
Director – Morrison School of Agribusiness  
Associate Dean – W. P. Carey School of Business for ASU Polytechnic

**GlobalResolve - Support Letter**

**From:** Mark Henderson  
**Sent:** Thursday, August 25, 2016 12:11 PM  
**To:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Subject:** Support for Concentration in Water Management

Larry,

I am writing in total support of this concentration proposal in Water Management for the MS in Environmental & Resource Management. As the director of GlobalResolve and a professor of Humanitarian Engineering, this concentration offers several advantages to our programs. First, it identifies MS students who might be interested in joining the GlobalResolve projects which are both for undergrads and graduate students. Second, it provides a level of water expertise in these M.S. students who work on Humanitarian Engineering projects that we operate in many developing countries every year. Of the projects we run each year, fully 25% deal with potable water and another 15% work on irrigation projects, all of which are a focus of this concentration.

I look forward to being able to talk with the students in this concentration about being involved in global development projects and in taking advantage of their expertise to improve conditions around the world.

Mark

**Mark Henderson, Ph.D.**  
President's Professor  
Associate Dean, Barrett, The Honors College  
Professor, Humanitarian Engineering  
Ira A Fulton Schools of Engineering  
Director, GlobalResolve  
<http://globalresolve.asu.edu>  
Arizona State University Polytechnic  
Phone: (480) 727-1062

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*ASU Affiliations:*  
Senior Sustainability Scientist,  
Julie Wrigley Global Institute of Sustainability  
Affiliate Faculty, School for the Future of Innovation in Society  
Affiliate Faculty, School of Public Programs

School of Sustainable Engineering and the Built Environment - Support Letter



Larry Olson, PhD  
The Polytechnic School  
Fulton Schools of Engineering

Peter Fox, PhD  
Professor and Graduate Program Chair  
School of Sustainable Engineering and the Built Environment  
PO Box 3005  
Arizona State University  
Tempe, AZ 85287

August 31, 2016

**REGARDING: Proposal to create Water Resources Management Concentration in Environmental Resource Management MS**

I have reviewed the proposal to create a concentration in Water Resources Management as part of the MS degree in Environmental Resource Management. The proposed concentration is complementary to our existing graduate degree programs in Civil, Environmental and Sustainable Engineering. There is no duplication of effort and the proposed concentration will focus on management while our degree programs will continue to focus on engineering. The number of students that might take courses such as CEE545 will not be significant as we do not anticipate a large number of students will meet the prerequisite requirements. Engineering students will benefit from the courses on law and water policy that will be offered through the ERM degree program and the proposed concentration. Therefore, I support the new concentration in Water Resources Management as it should benefit all programs and students involved.

Sincerely,

Dr. Peter Fox  
- Professor and Graduate Program Chair -

School of Sustainability – Support Letter

**From:** Christopher Boone  
**Sent:** Friday, December 02, 2016 3:46 PM  
**To:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Cc:** Candice Carr Kelman <[Candice.Carr.Kelman@asu.edu](mailto:Candice.Carr.Kelman@asu.edu)>; Caroline Harrison <[Caroline.Harrison@asu.edu](mailto:Caroline.Harrison@asu.edu)>  
**Subject:** Re: Concentration in Water Resources Management

Dear Larry,

On behalf of the School of Sustainability, I am very pleased to support the proposal for the Water Resources Management concentration for the MS in ERM. We are also very pleased to offer SOS 533 as an elective.

Christopher Boone  
Dean and Professor  
School of Sustainability, Arizona State University  
Executive Assistant: [Lorraine.Protocollo@asu.edu](mailto:Lorraine.Protocollo@asu.edu)  
480.965.2236

**From:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Date:** Friday, December 2, 2016 at 1:35 PM  
**To:** Christopher Boone <[Christopher.G.Boone@asu.edu](mailto:Christopher.G.Boone@asu.edu)>  
**Subject:** Concentration in Water Resources Management

Dear Dean Boone:

I am the Program Chair for Environmental & Resource Management (ERM) B.S. and M.S. degree programs in The Polytechnic School, which is part of the Fulton Schools of Engineering. We are proposing a concentration in Water Resources Management as part of our M.S. in ERM (see attachment which shows responses to the Graduate College).

I've been working with Sarah Porter, John Sabo, and Richard Morrison among others in developing the idea. As you can see the M.S. in ERM is a 30 semester hour degree and the proposed concentration would have 15 credit hours of required core and concentration courses with 9-15 hours of electives depending upon whether a student does a thesis, applied project or takes a comprehensive exam. One of the classes proposed as an elective is SOS 533 Sustainable Water.

The Graduate College has asked for a letter of support for the proposed concentration from the School of Sustainability. Would it be possible for you to do so via a return email? I would be glad to share more information on this with you or answer any questions if need be.

Thank you for considering this. I appreciate your time.

Best regards,

Larry Olson, Ph.D.  
Associate Professor  
Program Chair for Environmental & Resource Management  
The Polytechnic School  
Ira A. Fulton Schools of Engineering  
Senior Sustainability Scientist  
Julie Ann Wrigley Global Institute of Sustainability  
480-727-1499  
[Larry.Olson@asu.edu](mailto:Larry.Olson@asu.edu)

**Sandra Day O'Connor College of Law – Support Letter**

**From:** Judy Stinson  
**Sent:** Monday, December 05, 2016 7:09 PM  
**To:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Cc:** Douglas Sylvester (Dean) <[Douglas.Sylvester@asu.edu](mailto:Douglas.Sylvester@asu.edu)>  
**Subject:** Water Resources Management concentration

Dear Dr. Olson:

Dean Sylvester asked that I reply to your request on behalf of the Sandra Day O'Connor College of Law. We fully support the proposed a concentration in Water Resources Management as part of your M.S. in Environmental & Resource Management. This new concentration compliments other university offerings and parallels the law school's expansion of our Water Law focus (with Professor Larson's leadership). Please let me know if there is any other information we can provide, and we are confident this new concentration will be a wonderful addition!

-- Judy Stinson

Judith M. Stinson  
Associate Dean for Academic Affairs  
Sandra Day O'Connor College of Law  
Mail Code 9520  
Arizona State University  
111 E. Taylor St.  
Phoenix, AZ 85004-4467  
480-965-8512  
[judith.stinson@asu.edu](mailto:judith.stinson@asu.edu)

**From:** Larry Olson  
**Sent:** Friday, December 02, 2016 12:47 PM  
**To:** Douglas Sylvester (Dean) <[Douglas.Sylvester@asu.edu](mailto:Douglas.Sylvester@asu.edu)>  
**Subject:** Water Resources Management concentration

Dear Dean Sylvester:

I am the Program Chair for Environmental & Resource Management (ERM) B.S. and M.S. degree programs in The Polytechnic School, which is part of the Fulton Schools of Engineering. We are proposing a concentration in Water Resources Management as part of our M.S. in ERM (see attachment which shows responses to the Graduate College).

I've been working with Sarah Porter, John Sabo, and Richard Morrison among others in developing the idea. As you can see the M.S. in ERM is a 30 semester hour degree and the proposed concentration would have 15 credit hours of required core and concentration courses with 9-15 hours of electives depending upon whether a student does a thesis, applied project or takes a comprehensive exam. One of the classes

is ERM 535 Water Law and Policy. I know that Professor Rhett Larson teaches a similar course for the Law School and I have talked with him about the concentration. He is supportive (see email below).

The Graduate College has asked for a letter of support from the Sandra Day O'Connor College of Law. Would it be possible for you to do so via a return email? I would be glad to share more information on this with you or answer any questions if need be.

Thank you for considering this. I appreciate your time.

Best regards,

Larry Olson  
480-727-1499  
[Larry.Olson@asu.edu](mailto:Larry.Olson@asu.edu)

**From:** Rhett Larson  
**Sent:** Thursday, September 29, 2016 2:07 PM  
**To:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Subject:** RE: Water certificate

Dear Larry,

I apologize for the delay. I wholeheartedly support the proposed concentration in Water Resource Management in the MS in Environmental and Resource Management. As a beneficiary of a similar interdisciplinary degree myself, I believe this concentration will be enormously helpful in training future water leaders with an integrated, holistic appreciation of water resource management from a technical, legal, political, and ecological perspective. This kind of integrated, interdisciplinary program is critical in water education, and I am happy to provide whatever support I can. The ERM 535 Water Law and Policy course in particular is important as water scientists, engineers, and policymakers must be familiar with the legal context in which they work.

Best regards,

Rhett

[Professor Rhett Larson](#)  
Arizona State University  
Sandra Day O'Connor College of Law  
111 E. Taylor Street  
Phoenix, AZ 85004-4467  
(480) 727-7465  
[rhett.larson@asu.edu](mailto:rhett.larson@asu.edu)

**Morrison Institute for Public Policy – Support Letter**

**From:** Sarah Porter  
**Sent:** Tuesday, August 23, 2016 10:37 PM  
**To:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Subject:** RE: Water concentration

Hi, Larry.

I apologize for my delay in getting back to you. The proposal is excellent and we wholeheartedly support the establishment of the Water Management concentration as it will provide students with knowledge and skills that are increasingly important as we new demands and challenges with respect to water supply.

Please let me know how I can help with this.

Sarah

**Sarah Porter**  
Director, Kyl Center for Water Policy  
Morrison Institute for Public Policy  
Arizona State University  
411 N Central Ave, Ste 900  
Phoenix AZ 85004-0692  
o: 602-496-0586  
c: 602-828-0866

**From:** Larry Olson  
**Sent:** Wednesday, August 17, 2016 2:24 PM  
**To:** Sarah Porter <[s.porter@asu.edu](mailto:s.porter@asu.edu)>  
**Subject:** FW: Water concentration

Hi Sarah:  
Thanks for taking the time to meet with me earlier this summer. As we discussed, the Environmental & Resource Management program would like to add a concentration in Water Management to our M.S. in ERM. I've attached the proposal above.

Would it be possible to have a response to this email that would indicate your support for this new concentration? That would be important as we move through the curriculum approval process. We hope that the students in this program can be a valuable resource to the Kyl Center in the future.

Thanks,  
Larry

Larry Olson, Ph.D.  
Associate Professor  
Program Chair, Environmental & Resource Management  
The Polytechnic School  
Ira A. Fulton Schools of Engineering  
Arizona State University



**School for the Future of Innovation and Society – Support Letter**

**From:** Gary Grossman  
**Sent:** Friday, January 13, 2017 2:15 PM  
**To:** Larry Olson <[larry.olson@asu.edu](mailto:larry.olson@asu.edu)>  
**Cc:** David Guston <[David.Guston@asu.edu](mailto:David.Guston@asu.edu)>; Mary Jane Parmentier <[MJ.Parmentier@asu.edu](mailto:MJ.Parmentier@asu.edu)>  
**Subject:** Proposed Water Management Concentration in M.S. in Environmental & Resource Management  
**Importance:** High

Dear Larry,

Thank you for the opportunity to review your proposal for a Water Management concentration in the M.S. in Environment and Resource Management. In my view, this concentration will not only strengthen the degree in place, it will expand the value and impact of the degree to new student communities. Additionally, it will create an opportunity for students in other program areas, such as the graduate degrees in our School for the Future of Innovation in Society, to explore this very critical area whether their focus is Development, Policy, or Sustainability. I heartily support this proposal. Please feel free to call upon me to share my viewpoint in any forum in which this proposal is being considered. Many thanks.

Best regards,  
Gary

*Gary M. Grossman, Ph.D.  
Associate Director, School for the Future of Innovation in Society  
Consortium for Science, Policy and Outcomes  
Honors Faculty, Barrett, the Honors College  
Arizona State University  
PO Box 875603  
1120 S. Cady Mall Interdisciplinary B Room 366  
Tempe, AZ 85287-5603  
480-727-9533*