UNIVERSITY CURRICULUM COMMITTEE

Proposal for New Course

1. Is this course being proposed for Liberal Studies designation? Yes ☐ No ☒
If yes, route completed form to Liberal Studies.

2. New course effective beginning what term and year? (ex. Spring 2008, Summer 2008) **Fall 2007**
See effective dates schedule.

3. College **CENS** 4. Academic Unit **CENE**

5. Course subject/catalog number **CENE 462** 6. Units **3**

7. Co-convened with **CENE 562** 7a. Date approved by UGC _____
(Must be approved by UGC prior to bringing to UCC. Both course syllabi must be presented.)

8. Cross-listed with _____
(Please submit a single cross-listed syllabus that will be used for all cross-listed courses.)

9. Long course title **WATER QUALITY MODELING**
(max 100 characters including spaces)

10. Short course title (max. 30 characters including spaces) **WATER QUALITY MODELING**

11. Catalog course description (max. 30 words, excluding requisites).

Derivation and application of the systems of differential equations describing chemical and biotic transformations in lakes and streams. Procedures for calibrating and verifying water quality models.

12. Grading option: Letter grade ☒ Pass/Fail ☐ or Both ☐
(If both, the course may only be offered one way for each respective section.)

13. Is this a topics course? Yes ☐ No ☒

14. May course be repeated for *additional* units? yes ☐ no ☒
a. If yes, maximum units allowed? _____
b. If yes, may course be repeated for additional units in the same term? (ex. PES 100) yes ☐ no ☐

15. Please check **ONE** of the following that most appropriately describes the course:

Lecture w/0 unit embedded lab ☐ Lecture only ☒ Lab only ☐ Clinical ☐ Research ☐

Seminar ☐ Field Studies ☐ Independent Study ☐ Activity ☐ Supervision ☐

16. Prerequisites (must be completed ***before*** proposed course) **MAT 137 and CHM 151 with grades greater than or equal to C**

17. Corequisites (must be completed ***with*** proposed course) _____

18. If course has no requisites, will all sections of the course require (*If course has pre or co requisite, skip to question 19*):

instructor consent ☐ department consent ☐ no consent ☐

19. Is the course needed for a plan of study (major, minor, certificate)? yes ☐ no ☒
Name of new plan? _____
Note: A new plan or plan change form must be submitted with this request.

20. Does course duplicate content of existing courses within or outside of your college? yes ☐ no ☒
If yes, list any courses this course may have duplicative material with and estimate percentage of duplication:

_____

_____

_____

_____

Please attach letters of support from each department whose course is listed above.

21. Will this course affect other academic plans, academic units, or enrollment? yes ☐ no ☒
If yes, explain in justification and provide supporting documentation from the affected departments.

22. Is a potential equivalent course offered at a community college (lower division only)? yes ☐ no ☒
If yes, does it require listing in the *Course Equivalency Guide*? yes ☐ no ☐
Please list, if known, the institution, subject/catalog number of the course. _____

23. Justification for new course, including unique features if applicable. (Attach proposed syllabus in the approved university format).

Provides a much-needed technical elective in the Spring semester for civil and environmental engineering students.

24. Names of current faculty qualified to teach this course **Paul Gremillion, Wilbert Odem**

25. If course will require additional faculty, space, or equipment, how will these requirements be satisfied? _____

26. Will present library holdings support this course? yes ☒ no ☐

If the course being submitted for approval is NOT a LIBERAL STUDIES course, please go to step 42.

LIBERAL STUDIES ONLY

Contact name: _____ **Contact email:** _____

Dept. Chair name: _____ **Dept. Chair email:** _____

College Contact name : _____ **College Contact email:** _____

27. This course is a ☐ Single section ☐ Multi-section
28. List names of faculty who may teach this course: _____
29. Section enrollment cap: _____

If this course is being submitted for approval as a new LIBERAL STUDIES course, please complete questions 30-33.

OR

If this course is being submitted for approval as a new JUNIOR LEVEL WRITING course, please complete questions 37-38.

OR

If this course is being submitted for approval as a new SENIOR CAPSTONE course, please complete questions 39-41.

NEW LIBERAL STUDIES COURSE

30. Thematic Focus (check all that apply): ***If a topics course, must apply to ALL sections.***

Environmental Consciousness ☐ Technology and Its Impact ☐ Valuing the Diversity of Human Experience ☐

31. Distribution Block (check one): ***If a topics course, must apply to ALL sections.***

Aesthetic and Humanistic Inquiry ☐ Cultural Understanding ☐ Lab Science ☐

Science/Applied Science ☐ Social and Political Worlds ☐

32. Skills (check two): ***If a topics course, must apply to ALL sections.***

Creative Thinking ☐ Critical Reading ☐ Effective Oral Communication ☐ Effective Writing ☐ Critical Thinking ☐

Ethical Reasoning ☐ Quantitative/Spatial Analysis ☐ Scientific Inquiry ☐ Use of Technology ☐

33. Is this a topics course? Yes ☐ No ☐

If YES, please complete questions 34-36. If NO, please go to question 42.

TOPICS COURSE ONLY

34. Identify the Student Learning Outcomes that will be found in ALL topic syllabi offered under this course number. _____

35. Explain by what method(s) Student Learning Outcomes will be assessed in ALL topic syllabi offered under this course number.

_____

36. Please attach an example of a Topic Syllabus offered under this course number.

GO TO question 42

NEW JUNIOR LEVEL WRITING COURSE (*refer to question 19*)

37. To which degree programs offered by your department/academic unit does this proposal apply? _____

38. Do you intend to offer ABC 300 and ABC 300W? yes ☐ no ☐
If no, please submit a course delete form for the ABC 300.

GO TO question 42

NEW SENIOR CAPSTONE COURSE (*refer to question 19*)

39. To which degree programs offered by your department/academic unit does this proposal apply? _____

40. Does this proposal replace or modify an existing course or experience? yes ☐ no ☐
If yes, which course(s)? _____

41. Do you intend to offer ABC 400 and ABC 400C? yes ☐ no ☐
If no, please submit a course delete form for the ABC 400.

42. Approvals

11/15/06

Department Chair (if appropriate) Date

Chair of college curriculum committee Date

Dean of college Date

For Committees use only

For Liberal Studies Committee **Date**

Action taken:

_____ Approved as submitted _____ Approved as modified

For University Curriculum Committee **Date**

Action taken:

_____ Approved as submitted _____ Approved as modified

Course Syllabus
CENE 462 Water Quality Modeling

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<tr><td>General Information:</td><td>
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<tr><td>Course Prefix, Number, and Title</td><td>CENE 462, Water Quality Modeling</td></tr>
<tr><td>Semester:</td><td>Spring 2008</td></tr>
<tr><td>Clock Hours / Credit Hours:</td><td>Web-based, but intended to correspond to 3 clock hours per week; 3 credit hours.</td></tr>
<tr><td>Instructor:</td><td>Paul T. Gremillion, Ph.D., P.E., Assistant Professor</td></tr>
<tr><td>Office Address:</td><td>Room 203, Engineering, Bldg. 69
(928) 523-5382
Paul.Gremillion@nau.edu</td></tr>
<tr><td>Office Hours:</td><td>TBA, or by appointment.</td></tr>
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<tr><td>Student Learning Expectations / Outcomes for this Course:</td><td>On completing this course, students will be able to:
1. Derive and apply differential equations for water movement and transformations of chemical and biological constituents in lakes, rivers, and estuaries.
2. Develop spreadsheet models to apply non-steady state solutions of differential equations appropriate for lake, river, and estuary modeling.
3. Create solutions to a water quality problem using a pre-packaged numerical model.
4. Understand commonly accepted conventions for calibrating and verifying water quality models.
5. Recognize the limitations and capabilities of deterministic models of natural systems.</td></tr>
<tr><td>Course Structure and Approach:</td><td>This is a web-delivered course with weekly assignments consisting of homework and quizzes. There will be two weekly online sessions during which the instructor will conduct a discussion of the week's assignment and answer questions. All students will be required to complete a water quality modeling project. The scope of this project will be developed in consultation with the instructor. Students enrolled in the graduate section of this course, CENE 599, must meet all requirements expected of undergraduate students enrolled in CENE 499, but will also be required to write a review paper evaluating the state of knowledge of a contemporary issue in water quality modeling. Graduate students will also be assigned to lead online discussion groups and will be assigned to be mentors for undergraduate student projects.</td></tr>
<tr><td>Textbook and Required Materials:</td><td>Surface Water Quality Modeling, Steven C. Chapra, McGraw-Hill Companies, Inc., 1997, 844pp.

Journal articles and excerpted material from relevant text books will also be provided on the Vista web page.</td></tr>
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Recommended Optional Material / References:

Principles of Surface Water Quality Modeling and Control, Robert V. Thomann and John A. Mueller, Prentice Hall, 1997.

Course Outline:

Weeks 1 – 3:	Completely Mixed Systems
Weeks 4 – 6:	Incompletely Mixed Systems
Weeks 7 – 9:	Water Quality Environments
Weeks 10 – 12:	Dissolved Oxygen and Pathogens
Weeks 13 – 15:	Eutrophication and Temperature

Assessment of Student Learning Outcomes:

Methods of Assessment

Assessing students' achievement of this course's learning outcomes is done using homework, quizzes, examinations and project assignments.

Discussions and Homework: Homework is assigned to promote understanding of certain topics. Homework can include discussions, reading and written assignments, and short problem solving assignments.

Quizzes: Quizzes are given to assess understanding of particular topics.

Project: The course project will require students to apply their knowledge of the subject material in a realistic setting. An important aspect of the project is to develop a detailed solution to an open-ended problem.

Exams: A final exam are administered to assess achievement of certain course learning outcomes.

Timeline for Assessment

Homework is assigned throughout the semester with due dates specified. Typically these will be submitted in-person on Friday during the regular class meeting. Late homework is not graded. Quizzes will occur once every two weeks and are taken on-line. The final exam is given during week 16. The research paper is due on Monday of Week 15 (Reading Week).

Grading System:

Grading Scheme	Points
Discussions and Homework:	40
Quizzes	20
Course Project	30
Final Exam:	10
Total:	***100***

Grading Scale	
A	≥90%
B	≥80%
C	≥70%
D	≥60%
F	<60%

Course Policies:

Retests / Makeup Tests

There are no make-up assignments for homework and no make-up or restesting for quizzes and exams.

Attendance

Keeping current with the class material and participating in online discussions are the responsibility of the student.

Statement on Plagiarism and Cheating

Plagiarism, cheating, and other forms of misconduct are subject to the Arizona Board of Regents' Code of Conduct and the procedures outlined in the NAU Student Handbook Section 5-308. Websites for these documents may be consulted at:

Arizona Board of Regents' Code of Conduct:

	http://www.abor.asu.edu/1_the_regents/policymanual/chap5/index.html NAU Student Handbook: http://www4.nau.edu/stulife/handbook.htm NAU Student Code of Conduct: http://www4.nau.edu/stulife/handbookcode.htm Disciplinary Action: http://www4.nau.edu/stulife/handbookdisciplinary.htm
University Policies:	Safe Working and Learning Environment: http://oak.ucc.nau.edu/dam1/Safe%20Policy.htm Students with Disabilities: http://www2.nau.edu/dss/ Institutional Review Board: http://www4.nau.edu/ovp/irb/index.htm Academic Integrity Guidance: http://www.nau.edu/library/information/guides/plagiarism.html
College of Engineering and Natural Sciences Policies:	**Professional Ethics and Code of Conduct** Exceptionally high standards of honor and integrity are fundamental and essential to the study and practice of engineering. Academic preparation for the profession must be conducted in an atmosphere which fosters these values. In addition to compliance with the Student Code of Conduct and Policy that apply to all students at NAU, engineering students are expected to conduct themselves professionally. Violation of the National Society of Professional Engineers (NSPE) Code of Ethics, found at http://www.nspe.org/ethics/eh1-code.asp or the Association of Computing Machinery (ACM) Code of Ethics and Professional Conduct, found at http://www.acm.org/constitution/code.html may lead to dismissal from the College's academic programs. Violations of any of these codes will be handled as detailed in the publications listed above, and will be documented in the student's advisement file. Faculty members may ask students to affirm in writing that they have neither given nor received unauthorized aid on an examination or assignment.

Course Syllabus
CENE 562 Water Quality Modeling

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<tr><td>Semester:</td><td>Spring 2008</td></tr>
<tr><td>Clock Hours / Credit Hours:</td><td>Web-based, but intended to correspond to 3 clock hours per week; 3 credit hours.</td></tr>
<tr><td>Instructor:</td><td>Paul T. Gremillion, Ph.D., P.E., Assistant Professor</td></tr>
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Methods of Assessment

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Discussions and Homework:	40
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Research Paper	20
Undergraduate Mentoring	15
Final Exam:	10
Total:	***135***

Grading Scale	
A	≥90%
B	≥80%
C	≥70%
D	≥60%
F	<60%

Course Policies:

Retests / Makeup Tests

There are no make-up assignments for homework and no make-up or restesting for quizzes and exams.

Attendance

Keeping current with the class material and participating in online discussions are the responsibility of the student.

	Statement on Plagiarism and Cheating Plagiarism, cheating, and other forms of misconduct are subject to the Arizona Board of Regents' Code of Conduct and the procedures outlined in the NAU Student Handbook Section 5-308. Websites for these documents may be consulted at: Arizona Board of Regents' Code of Conduct: http://www.abor.asu.edu/1_the_regents/policymanual/chap5/index.html NAU Student Handbook: http://www4.nau.edu/stulife/handbook.htm NAU Student Code of Conduct: http://www4.nau.edu/stulife/handbookcode.htm Disciplinary Action: http://www4.nau.edu/stulife/handbookdisciplinary.htm
University Policies:	Safe Working and Learning Environment: http://oak.ucc.nau.edu/dam1/Safe%20Policy.htm Students with Disabilities: http://www2.nau.edu/dss/ Institutional Review Board: http://www4.nau.edu/ovp/irb/index.htm Academic Integrity Guidance: http://www.nau.edu/library/information/guides/plagiarism.html
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NORTHERN ARIZONA UNIVERSITY

UNIVERSITY GRADUATE COMMITTEE

GRADUATE CURRICULUM
PROPOSAL FOR NEW GRADUATE COURSE

1. New course effective with what term and year? (i.e., Spring 2007): **Fall 2007**
2. College: **CENS**
3. Department:**CENE**
4. Course Subject/Catalog Number: **CENE 562**
5. Units: **3**
6. Co-convened with: **CENE 462**
   (Must be approved by UGC prior to submission to UCC. Both course syllabi must be submitted.)
7. Cross-listed with:
   (Must be approved by UGC prior to submission to UCC. Both course syllabi must be submitted.)
8. Long Course Title:
9. Short Course Title (30-character maximum, including spaces): **WATER QUALITY MODELING**
10. Catalog Course Description (60-word maximum): **The chemical, physical, and biological processes that control water quality in lakes and streams, and the systems of differential equations that can be used to describe these transformations. Derivation and application of these equations using spreadsheets and pre-packaged software. Procedures for calibrating and verifying these models and analysis of the capabilities and limitations of mathematical representations of natural systems.**
11. Grading Option: ☒ letter grade ☐ Pass/Fail ☐ Both
12. May this course be repeated for *additional* units? ☐ Yes ☒ No

    12.b. If yes, what are the maximum units allowed?

    12.c. If yes, may course be repeated from additional units in the *same term*? ☐ Yes ☐ No
13. Please check **ONE** of the following that most accurately describes the format of the course:

    ☒ Lecture Only ☐ Clinical
    ☐ Lab Only ☐ Research
    ☐ Lecture and Lab Combined

☐ Seminar
☐ Field Studies
☐ Independent Study
☐ Activity
☐ Supervision

13b. If the course will be delivered electronically, check **ONE** of the following:

☒ Web
☐ ITV
☐ Other (hybrid, for example). Please explain:

14. Prerequisites: (must be completed ***before*** taking proposed course):

15. Corequisites: (must be completed ***with*** proposed course):

16. If course has no requisites, what consent will be required for all sections? (Check only one.)

☒ Instructor Consent
☐ Department Consent
☐ No Consent Required.

17. Justification for new course (including unique features, if any): **Provides additional course for Master of Engineering and anticipated Master of Science in Engineering programs.**

18. Is this course required for a new plan? ☐ Yes ☒ No
If plan has not been approved, you must also submit a plan form that includes the addition of this course.

18.b. If yes, has the plan been approved? ☐ Yes ☐ No

18.c. When?

18.d. Name of plan:

19. Does this course duplicate content of existing courses? ☐ Yes ☒ No

19.b. If yes, list every course with duplicate material and estimate the percentage of duplication.

Letters of support from each department with a course listed above must accompany this form.

20. Will this course affect other academic plans, units, or enrollment? ☐ Yes ☒ No

Letters of support from each department affected must accompany this form.

21. Names of current faculty qualified to teach this course:

22. If this course requires additional faculty, space, or equipment, how will these requirements be met?

23. Will present library holdings support this course? ☒ Yes ☐ No

24. Approvals

11/15/06

Department Chair (if appropriate) Date

Chair of college curriculum committee Date

Dean of College Date

For University Graduate Committee use only

Approved: _____

Date

Course Syllabus
CENE 562 Water Quality Modeling

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University Policies:	Safe Working and Learning Environment: http://oak.ucc.nau.edu/dam1/Safe%20Policy.htm Students with Disabilities: http://www2.nau.edu/dss/ Institutional Review Board: http://www4.nau.edu/ovp/irb/index.htm Academic Integrity Guidance: http://www.nau.edu/library/information/guides/plagiarism.html
College of Engineering and Natural Sciences Policies:	**Professional Ethics and Code of Conduct** Exceptionally high standards of honor and integrity are fundamental and essential to the study and practice of engineering. Academic preparation for the profession must be conducted in an atmosphere which fosters these values. In addition to compliance with the Student Code of Conduct and Policy that apply to all students at NAU, engineering students are expected to conduct themselves professionally. Violation of the National Society of Professional Engineers (NSPE) Code of Ethics, found at http://www.nspe.org/ethics/eh1-code.asp or the Association of Computing Machinery (ACM) Code of Ethics and Professional Conduct, found at http://www.acm.org/constitution/code.html may lead to dismissal from the College's academic programs. Violations of any of these codes will be handled as detailed in the publications listed above, and will be documented in the student's advisement file. Faculty members may ask students to affirm in writing that they have neither given nor received unauthorized aid on an examination or assignment.

Course Syllabus
CENE 462 Water Quality Modeling

<table>
<tr><td>General Information:</td><td>
<table>
<tr><td>Name of College and Department:</td><td>Civil & Environmental Engineering, College of Engineering and Natural Sciences</td></tr>
<tr><td>Course Prefix, Number, and Title</td><td>CENE 462, Water Quality Modeling</td></tr>
<tr><td>Semester:</td><td>Spring 2008</td></tr>
<tr><td>Clock Hours / Credit Hours:</td><td>Web-based, but intended to correspond to 3 clock hours per week; 3 credit hours.</td></tr>
<tr><td>Instructor:</td><td>Paul T. Gremillion, Ph.D., P.E., Assistant Professor</td></tr>
<tr><td>Office Address:</td><td>Room 203, Engineering, Bldg. 69
(928) 523-5382
Paul.Gremillion@nau.edu</td></tr>
<tr><td>Office Hours:</td><td>TBA, or by appointment.</td></tr>
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</td></tr>
<tr><td>Course Prerequisites:</td><td>MAT 137 and CHM 151 or permission of instructor.</td></tr>
<tr><td>Course Description:</td><td>Water quality modeling has its origins in the study of oxygen depletion and re-aeration downstream from wastewater discharges. We will study this classic example as well as many other water quality phenomena. This course will emphasize two areas of study: (1) The chemical, physical, and biological processes that control water quality in lakes and streams, and (2) the systems of differential equations that can be used to describe these transformations. We will derive and apply these equations using spreadsheets and pre-packaged software. We will examine procedures for calibrating and verifying these models and consider the capabilities and limitations of mathematical representations of natural systems.</td></tr>
<tr><td>Student Learning Expectations / Outcomes for this Course:</td><td>On completing this course, students will be able to:
6. Derive and apply differential equations for water movement and transformations of chemical and biological constituents in lakes, rivers, and estuaries.
7. Develop spreadsheet models to apply non-steady state solutions of differential equations appropriate for lake, river, and estuary modeling.
8. Create solutions to a water quality problem using a pre-packaged numerical model.
9. Understand commonly accepted conventions for calibrating and verifying water quality models.
10. Recognize the limitations and capabilities of deterministic models of natural systems.</td></tr>
<tr><td>Course Structure and Approach:</td><td>This is a web-delivered course with weekly assignments consisting of homework and quizzes. There will be two weekly online sessions during which the instructor will conduct a discussion of the week's assignment and answer questions. All students will be required to complete a water quality modeling project. The scope of this project will be developed in consultation with the instructor. Students enrolled in the graduate section of this course, CENE 599, must meet all requirements expected of undergraduate students enrolled in CENE 499, but will also be required to write a review paper evaluating the state of knowledge of a contemporary issue in water quality modeling. Graduate students will also be assigned to lead online discussion groups and will be assigned to be mentors for undergraduate student projects.</td></tr>
<tr><td>Textbook and Required Materials:</td><td>Surface Water Quality Modeling, Steven C. Chapra, McGraw-Hill Companies, Inc., 1997, 844pp.

Journal articles and excerpted material from relevant text books will also be provided on the Vista web page.</td></tr>
</table>

Recommended Optional Material / References:

Principles of Surface Water Quality Modeling and Control, Robert V. Thomann and John A. Mueller, Prentice Hall, 1997.

Course Outline:

Weeks 1 – 3:	Completely Mixed Systems
Weeks 4 – 6:	Incompletely Mixed Systems
Weeks 7 – 9:	Water Quality Environments
Weeks 10 – 12:	Dissolved Oxygen and Pathogens
Weeks 13 – 15:	Eutrophication and Temperature

Assessment of Student Learning Outcomes:

Methods of Assessment

Assessing students' achievement of this course's learning outcomes is done using homework, quizzes, examinations and project assignments.

Discussions and Homework: Homework is assigned to promote understanding of certain topics. Homework can include discussions, reading and written assignments, and short problem solving assignments.

Quizzes: Quizzes are given to assess understanding of particular topics.

Project: The course project will require students to apply their knowledge of the subject material in a realistic setting. An important aspect of the project is to develop a detailed solution to an open-ended problem.

Exams: A final exam are administered to assess achievement of certain course learning outcomes.

Timeline for Assessment

Homework is assigned throughout the semester with due dates specified. Typically these will be submitted in-person on Friday during the regular class meeting. Late homework is not graded. Quizzes will occur once every two weeks and are taken on-line. The final exam is given during week 16. The research paper is due on Monday of Week 15 (Reading Week).

Grading System:

Grading Scheme	Points
Discussions and Homework:	40
Quizzes	20
Course Project	30
Final Exam:	10
Total:	***100***

Grading Scale	
A	≥90%
B	≥80%
C	≥70%
D	≥60%
F	<60%

Course Policies:

Retests / Makeup Tests

There are no make-up assignments for homework and no make-up or restesting for quizzes and exams.

Attendance

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University Policies:	Safe Working and Learning Environment: http://oak.ucc.nau.edu/dam1/Safe%20Policy.htm Students with Disabilities: http://www2.nau.edu/dss/ Institutional Review Board: http://www4.nau.edu/ovp/irb/index.htm Academic Integrity Guidance: http://www.nau.edu/library/information/guides/plagiarism.html
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