1. **MAJOR REQUIREMENTS**– complete the table below by listing the major requirements, including required number of units, required core, electives, and any special requirements, including emphases\* (sub-plans), thesis, internships, etc. Note: information in this section must be consistent throughout the proposal documents (comparison charts, four-year plan, curricular/assessment map, etc.). Delete the EXAMPLE column before submitting/uploading. Complete the table in Appendix A if requesting a corresponding minor.   
     
   **UNDERGRADUATE**

|  |  |  |
| --- | --- | --- |
| **Total units required to complete the degree** |  | EXAMPLE  120 |
| **Upper-division units required to complete the degree** |  | 42 |
| **Foundation courses** |  |  |
| [Second language](http://catalog.arizona.edu/policy/second-language-requirement-undergraduate-degrees) |  | 2nd Semester Proficiency |
| [Math](http://catalog.arizona.edu/policy/mathematics-requirements-foundations) |  | G-Strand |
| [General education requirements](http://catalog.arizona.edu/policy/general-education-tier-one-and-tier-two) |  | Entry Course (1 unit)  Exploring Perspectives (4 courses, 12 units) (one course from each domain required)  -Artist  -Humanist  -Natural Scientist  -Social Scientist  Building Connections (3 courses, 9 units)  Exit Course (1 unit) |
| **Pre-major? (Yes/No). If yes, provide requirements. Provide email(s)/letter(s) of support from home department head(s) for courses not owned by your department.** |  | Yes. Complete the following coursework:  -CHEM 151 (4) General Chemistry I  -CHEM 152 (4) General Chemistry II  Complete 1 course from the following:  -PHYS 140 (3) Introductory Mechanics  -PHYS 141 (4) Introductory Mechanics |
| **List any special requirements to declare or gain admission to this major (completion of specific coursework, minimum GPA, interview, application, etc.)** |  | -Complete all pre-major coursework with 2.5 GPA.  -Complete interview with department.  -Submit career path vision statement. |
| **Major requirements** |  |  |
| **Minimum # of units required in the major (units counting towards major units and major GPA)** |  | 56 |
| **Minimum # of upper-division units required in the major (upper division units counting towards major GPA)** |  | 38 |
| [**Minimum # of residency units to be completed in the major**](https://catalog.arizona.edu/policy/graduation-grade-averages-and-credit-requirements) |  | 18 |
| **Required supporting coursework (courses that do not count towards major units and major GPA, but are required for the major). Courses listed must include prefix, number, units, and title. Include any limits/restrictions needed (house number limit, etc.). Provide email(s)/letter(s) of support from home department head(s) for courses not owned by your department.** |  | List all required supporting coursework.  -MATH 129 (3) Calculus II  Complete 1 of the following:  -PHYS 240 (3) Introductory Electricity and Magnetism  -PHYS 241 (4) Introductory Electricity and Magnetism |
| **Major requirements. List all major requirements including core and electives. If applicable, list the emphasis requirements for each proposed emphasis\*. Courses listed count towards major units and major GPA. Courses listed must include prefix, number, units, and title. Mark new coursework (New). Include any limits/restrictions needed (house number limit, etc.). Provide email(s)/letter(s) of support from home department head(s) for courses not owned by your department.** |  | List all required major coursework.  For example:  Fire Services Core: Complete 2 courses (6 units)  -(New)FIRE 345 (3) Introduction to Fire  -(New) FIRE 346 (3) Advanced Fire  Fire Management Electives: Complete 18 units from the following. Limit of 6 units from house-numbered coursework may be used towards this requirement :  Select one emphasis from:  Fire Management  Fire Safety Education  General |
| **Internship, practicum, applied course requirements (Yes/No). If yes, provide description.** |  | Yes. Complete 6 units:  FIRE 493 (6) Fire Fighting Internship. Students complete internship at a fire station. |
| **Senior thesis or senior project required (Yes/No). If yes, provide description.** |  | Yes. Complete 6 units:  FIRE 498 (6) Fire Senior Thesis |
| **Additional requirements (provide description)** |  | -Present Senior Thesis and Internship experience at departmental conference. |
| **Minor (specify if optional or required)** |  | Optional |
| **Any** [**double-dipping restrictions**](https://catalog.arizona.edu/policy/double-use-courses-double-dipping) **(Yes/No)? If yes, provide description.** |  | Yes, major core courses not permitted to double-dip. |

**GRADUATE**

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| **Total units required to complete the degree** |  | EXAMPLE  60 |
| **Pre-admissions expectations (i.e., academic training to be completed prior to admission)** |  | Earned bachelor’s degree; training in field; statement of purpose |
| **Major requirements. List all major requirements including core and electives. If applicable, list the emphasis requirements for each proposed emphasis\*. Courses listed must include course prefix, number, units, and title. Mark new coursework (New). Include any limits/restrictions needed (house number limit, etc.). Provide email(s)/letter(s) of support from home department head(s) for courses not owned by your department.** |  | Complete 12 units of core coursework:  -ECOL 547 (3) Introduction to Theoretical Ecology  -ARE 631 (3) Arts-based Research  -MAS 587 (3) Chicana Gender Perspectives  -DNC 500 (3) Dance and Culture  Complete 18 units of electives from the following list. At least 3 units must be internship or practicum. Limit of 9 units of independent study may be used towards this requirement.:  Complete 12 units of theory and method coursework from the following list:  Complete 18 units of dissertation |
| **Research methods, data analysis, and methodology requirements (Yes/No). If yes, provide description.** |  | Yes. Students complete 12 units of theory and method in the field. |
| **Internship, practicum, applied course requirements (Yes/No). If yes, provide description.** |  | Yes. Students complete 3 units of an internship or practicum in the field. |
| **Master thesis or dissertation required (Yes/No). If yes, provide description.** |  | Yes. Students complete 18 units of dissertation. |
| **Additional requirements (provide description)** |  | Written and oral comprehensive examinations  Oral dissertation defense |
| **Minor options (as relevant)** |  | No required minor options. Open options. |

\*Emphases are officially recognized sub-specializations within the discipline. [ABOR Policy 2-221 c. Academic Degree Programs Subspecializations](https://public.azregents.edu/Policy%20Manual/2-221-Academic%20Degree%20Programs.pdf) requires all undergraduate emphases within a major to share at least 40% curricular commonality across emphases (known as “major core”). Total units required for each emphasis must be equal. Proposed emphases having similar curriculum with other plans (within department, college, or university) may require completion of an additional comparison chart. Complete the table found in Appendix B to indicate if emphases should be printed on student transcripts and diplomas.

1. **CURRENT COURSES**–using the table below, list all existing courses included in the proposed major. You can find information to complete the table using the [UA course catalog](https://uaccess.schedule.arizona.edu/psp/pubsaprd/UA_CATALOG/HRMS/h/?tab=DEFAULT)  or [UAnalytics](https://analytics.uaccess.arizona.edu/analytics/saw.dll?dashboard&PortalPath=%2Fshared%2FStudent%2F_portal%2FCatalog%20and%20Schedule) (Catalog and Schedule Dashboard> “Printable Course Descriptions by Department” On Demand Report; right side of screen). If the courses listed belong to a department that is not a signed party to this implementation request, upload the department head’s permission to include the courses in the proposed program and information regarding accessibility to and frequency of offerings for the course(s). Upload letters of support/emails from department heads to the “Letter(s) of Support” field on the UAccess workflow form. Add or remove rows to the table, as needed.

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| **Course prefix and number (include cross-listings)** | **Units** | **Title** | **Pre-requisites** | **Modes of delivery (online, in-person, hybrid)** | **Typically Offered**  **(F, W, Sp, Su)** | **Dept signed party to proposal? (Yes/No)** |
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1. **NEW COURSES NEEDED** – using the table below, list any new courses that must be created for the proposed program. If the specific course number is undetermined, please provide level (i.e., CHEM 4XX). Add rows as needed.

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| **Course prefix and number (include cross-listings)** | **Units** | **Title** | **Pre-requisites** | **Modes of delivery (online, in-person, hybrid)** | **Status\*** | **Anticipated first term offered** | **Typically Offered**  **(F, W, Sp, Su)** | **Dept signed party to proposal? (Yes/No)** | **Faculty members available to teach the courses** |
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\*In development (D); submitted for approval (S); approved (A)

1. **FACULTY INFORMATION-** complete the table below. If UA Vitae link is not provided/available, add CVs to a Box folder and provide that link. UA Vitae profiles can be found in the [UA directory/phonebook](https://directory.arizona.edu/phonebook).Add rows as needed. Delete the EXAMPLE rows before submitting/uploading. **NOTE: full proposals are distributed campus-wide, posted on committee agendas and should be considered “publicly visible”. Contact** [**Office of Curricular Affairs**](mailto:curricular_affairs@list.arizona.edu) **if you have concerns about CV information being “publicly visible”.**

|  |  |  |
| --- | --- | --- |
| Faculty Member | Involvement | UA Vitae link or Box folder link |
| EX: Joan Smith | Teach FIRE 388 | Box folder link |
| EX: Mike Smith | Teach FIRE 387, Faculty advisor, Internship supervisor | UA Vitae link |
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1. **GRADUATION PLAN –** provide a sample degree plan, based on your program that includes all requirements to graduate with this major and takes into consideration course offerings and sequencing. *Undergraduate programs: please complete* [*Addendum D: 4-Year Plan*](https://arizona.box.com/s/8dyd6ze3d0efv5mpf1wo3zui9hqskk7x) *for Degree Search. Use generic title/placeholder for requirements with more than one course option (e.g., Upper Division Major Elective, Minor Course, Second Language, GE).* Add rows as needed.

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| **Semester 1** | | **Semester 2** | | **Semester 3** | | **Semester 4** | |
| **Course prefix and number** | **Units** | **Course prefix and number** | **Units** | **Course prefix and number** | **Units** | **Course prefix and number** | **Units** |
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| **Semester 5** | | **Semester 6** | | **Semester 7** | | **Semester 8** | |
| **Course prefix and number** | **Units** | **Course prefix and number** | **Units** | **Course prefix and number** | **Units** | **Course prefix and number** | **Units** |
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| **Total** |  | **Total** |  | **Total** |  | **Total** |  |

1. **Learning Outcomes and Curriculum Map** - Complete these tables as a summary of the learning outcomes from your assessment plan and an overview of where learning outcomes are addressed in the program. Use the examples below as models and refer to the explanations beneath each table. Additional resources are available from the [University Center for Assessment, Teaching and Technology](https://ucatt.arizona.edu/assessment/learning-outcomes-assessment/academic-program-learning-assessment).

**Learning Outcomes**

|  |
| --- |
| **Learning Outcome #1:** Students will design, implement, and test programs that solve significant and meaningful problems, making appropriate design choices that best meet given requirements. |
| **Concepts:** Software design, correctness, problem types: classification, clustering, and generation |
| **Competencies:** Incorporating artificial intelligence solutions into larger software projects, online learning, reducing real-world problems to problems solvable with artificial intelligence techniques, assessing limitations of existing artificial intelligence techniques |
| **Assessment Methods:** coding exercises, written reports and analyses (direct), and student exit survey (indirect) |
| **Measures:** instructor grading of coding exercises, reports, homework assignments, and exams, responses to student exit survey |
| **Learning Outcome #2:**  Students will design and analyze algorithms and reason about their correctness and performance. |
| **Concepts:** Runtime and storage complexity, big-O notation, program correctness |
| **Competencies:** compare algorithm types for a problem, estimate algorithm complexity, implement and compare sorting and searching algorithms, specify and choose optimal data structures for a given problem |
| **Assessment Methods:** programming assignments, analyze pseudo-code, analyze multiple algorithmic solutions to the same problem (direct), and student exit survey (indirect) |
| **Measures:** correctness against test cases, instructor grading of homework assignments and exams, responses to student exit survey |
| **Learning Outcome #3:** Students will analyze and compare algorithms that learn from data and evaluate their performance in realistic settings. |
| **Concepts:** Statistical analysis, data interpretation, building and evaluating predictive models, domain adaptation |
| **Competencies:** estimate decision boundaries, define and apply informative evaluation metrics, conduct hypothesis testing, train and evaluate models in multiple domains |
| **Assessment Methods:** implementation of algorithms, theoretical analysis of algorithms,improvements and modifications of known algorithms, experimental design, empirical evaluation (direct), and student exit survey (indirect) |
| **Measures:** test cases against benchmarks, instructor grading of homework assignments and exams, responses to student exit survey |
| **Learning Outcome #4:** Students will employ the underlying statistical and mathematical foundations of modern artificial intelligence and machine learning algorithms to build predictive models. |
| **Concepts:** statistical mathematical foundations, linear algebra, calculus |
| **Competencies:** define and calculate conditional probabilities, test for statistical independence, perform operations on vectors and matrices, calculate the gradient for simple functions, define loss functions |
| **Assessment Methods:** exams and homework assignments, programming assignments and projects (direct), and student exit survey (indirect) |
| **Measures:** instructor grading of exams and homework assignments, responses to student exit survey |
| **Learning Outcome #5:** Students will develop algorithmic solutions using AI techniques for a domain-specific problem and assess their societal impact when deployed. |
| **Concepts:** data acquisition and preprocessing, data quality, building models with artificial intelligence techniques, evaluation, consequences of deploying artificial intelligence solutions in the real world |
| **Competencies:** collect and clean data, analyze and evaluate the data, establish baselines, build predictive models |
| **Assessment Methods:** Capstone project, homeworks and projects with real data, reports describing and justifying decisions that best match the chosen problem (direct), and student exit survey (indirect) |
| **Measures:** instructor grading of intermediate and final report, instructor grading of implementation, evaluation against benchmarks, , responses to student exit survey |

*Explanation:* ***Concepts****are the topics that students will learn in the program.****Competencies****are the skills they will learn. A****learning outcome****is their ability to apply the skills to the topics, or to use the skills and the topics together, in an observable way. The****assessment method****is where students will demonstrate the learning outcome, and a****measure****is how data will be pulled from the assessment method. Include both a direct and indirect assessment method and measurement for each learning outcome. Competencies and the learning outcomes need to reflect higher level learning: consider using verbs from the Application, Analysis, Synthesis, and Evaluation columns from this list when writing learning outcomes:* [*https://arizona.app.box.com/s/orx6coex8607hlmenrgl7dznhzjicpit*](https://arizona.app.box.com/s/orx6coex8607hlmenrgl7dznhzjicpit)*. We recommend 3-5 Learning Outcomes for a degree program.*

**Curriculum Map**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | CSC 110 | CSC 120 | CSC 144 | CSC 210 | CSC 244 | CSC 2XX | CSC 3XX | CSC 345 | CSC 380 | CSC 480 | CSC 498 |
| LO #1: Students will design, implement, and test programs that solve significant and meaningful problems, making appropriate design choices that best meet given requirements. | I | R |  | R |  |  |  |  |  |  | M |
| LO #2: Students will design and analyze algorithms and reason about their correctness and performance. |  | I | I | R | R |  |  | M |  |  |  |
| LO #3: Students will analyze and compare algorithms that learn from data and evaluate their performance in realistic settings. |  |  |  |  |  | I |  |  | R | M |  |
| LO #4: Students will employ the underlying statistical and mathematical foundations of modern artificial intelligence and machine learning algorithms to build predictive models. |  |  |  |  |  |  |  |  | I | R/M |  |
| LO #5: Students will develop algorithmic solutions using AI techniques for a domain-specific problem and assess their societal impact when deployed. |  |  |  |  |  | I | I/R |  | R | R | M |

*Explanation: The curriculum map lists the required courses for the program and indicates where each LO will be introduced (I), reinforced (R), and mastered (M). This is important to show that you are including adequate teaching of the skills and concepts to support the LOs. Each row (LO) should have at least one I, R, and M in it. Usually (but not always) there is more than one R. Usually (but not always) there is only one I and one M. Generally, Is come first, followed by Rs, and Ms are last. Each column (class) should have at least one letter in it, but not every box needs to be filled in*

1. **PROGRAM ASSESSMENT PLAN-** using the table below, provide a schedule for program evaluation 1) while students are in the program and 2) after completion of the major. Add rows as needed. Delete EXAMPLE rows.

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| **Assessment Measure** | **Source(s) of Evidence** | **Data Collection Point(s)** |
| EXAMPLE: Job Placement Statistics | Student/Alumni Survey | At graduation and as part of alumni survey |
| EXAMPLE: Academic Program Review | Reviewers’ responses | Every 7 years |
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1. **ANTICIPATED STUDENT ENROLLMENT**-complete the table below. What concrete evidence/data was used to arrive at the numbers?

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| --- | --- | --- | --- | --- | --- |
| **5-YEAR PROJECTED ANNUAL ENROLLMENT** | | | | | |
|  | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
| Number of Students |  |  |  |  |  |

Data/evidence used to determine projected enrollment numbers:

1. **ANTICIPATED DEGREES AWARDED**- complete the table below, beginning with the first year in which degrees will be awarded. How did you arrive at these numbers? Take into consideration departmental retention rates. Use [National Center for Education Statistics College Navigator](https://nces.ed.gov/collegenavigator/) to find program completion information of peer institutions offering the same or a similar program.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **PROJECTED DEGREES AWARDED ANNUALLY** | | | | | | |
|  | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
| Number of Degrees |  |  |  |  |  |

Data/evidence used to determine number of anticipated degrees awarded annually:

**Appendix A. Minor Requirements.** Complete if requesting a corresponding minor. Delete EXAMPLE column and verbiage as it applies to your level degree (i.e., undergraduate vs graduate) before submitting.

**MINOR**

|  |  |  |
| --- | --- | --- |
| **Minimum total units required** |  | EXAMPLE  18 |
| **Minimum upper-division units required** |  | 9 |
| **Total transfer units that may apply to the minor** |  | 9 |
| **List any special requirements to declare/admission to this minor (completion of specific coursework, minimum GPA, interview, application, etc.)** |  | -Meet with departmental interview committee  -Complete all pre-requisite coursework |
| **Minor requirements. List all minor requirements including core and electives. Courses listed must include course prefix, number, units, and title. Mark new coursework (New). Include any limits/restrictions needed (house number limit, etc.). Provide email(s)/letter(s) of support from home department head(s) for courses not owned by your department.** |  | List all required coursework.  For example:  **Actuary core:**  **Complete 2 courses (6 units):**  -(NEW) ACTU 123 (3) Introduction to Actuarial Sciences  -(NEW) ACTU 345 (3) Advanced Actuarial Methods  **Actuary Electives:** Complete 12 units from the following: |
| **Internship, practicum, applied course requirements (Yes/No). If yes, provide description.** |  | Yes. Complete 3 units of internship or practicum with a local firm. |
| **Additional requirements (provide description)** |  | Complete and submit “Actuary Minor Reflection Paper” |
| **Any** [**double-dipping restrictions**](https://catalog.arizona.edu/policy/double-use-courses-double-dipping) **(Yes/No)? If yes, provide description.** |  | Yes, minor coursework may not double dip with another minor. |

**Appendix B. Emphasis Print Information**-if applicable, complete the table below to indicate if proposed emphases should be printed on transcript and diploma. Add rows as needed. Note: emphases are displayed on transcript and diplomas as “ \_\_\_\_\_\_\_ Emphasis”. Delete EXAMPLE row before submitting.

|  |  |  |
| --- | --- | --- |
| Emphasis | Print on transcript | Print on diploma |
| EX: Fire Safety | Yes | Yes |
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