Bachelor of Science Degree in Hydrology and Atmospheric Sciences (**HAS major, EHY Track**)
Departmental Advisor Grid ⌘ Catalog **AY2018-2019**

FALL			COMMON FRESHMAN CORE		SPRING		
	LANG Req	4	2nd Semester-level language proficiency requirement		**MATH 129**	3	Calculus II
	MATH122A **MATH 122B**	5	Functions for Calculus 1st Semester Calculus		**CHEM152**	4	General Chemistry II
	CHEM151	4	General Chemistry I		**GEOS 251**	4	Physical Geology
	ENGL 101	3	First-Year Composition I		**ENGL 102**	3	First-Year Composition II
	Tier1INDV[1]	3	*Gen Ed Elective*		**HWRS 195a**	1	Careers in Hydro & Atmo Sci.
			TOTAL 15-19				TOTAL 15

FALL			SOPHOMORE YEAR		SPRING		
	MATH 223	4	Vector Calculus		**C E 218**	3	Mechanics of Fluids
	HWRS 350	3	**Principles of Hydrology**		**MATH 254**	3	Intro Ordinary Diff Equations
	PHYS 141	4	Introduction to Mechanics		**GEOS 304**	4	Structural Geol. [OR GEOS302]
	Tier1TRAD[1]	3	*Gen Ed Elective*		**Tier1TRAD**[1]	3	*Gen Ed Elective*
	Tier1 INDV	3	*Gen Ed Elective*		**PHYS 143**	2	Intro Optics-Thermodynamics
			TOTAL 17				TOTAL 15

FALL			JUNIOR YEAR		SPRING		
	HWRS 431	4	Hydrogeology		**Tech Elec** [2]	3	*Elective:*
	SIE 305	3	Intro Engr. Probability & Statistics		**ATMO 436A**	3	Fundamentals of the Atmospheric Sciences
	CE 427 [3]	3	Comp App Hydraulics [**OR other HAS Elective**]		**Tech Writing & Communication Theme**	3	*Choose from: ENVS 408, ENVS 415, JOUR 455, JOUR 472, ENGL 313, ENGL 308*
	Tier2INDV[1]	3	*Gen Ed Elective*		**CE 423**	3	Hydrology
	Comp Elec Theme	3	Choose from: ATMO/HWRS 430, HWRS 428/528, RNR 403, RNR 417, OR CSC 250		**HWRS 413A**	3	**Field Hydrology** (2 cr. in Spring + 1 cr. Summer pre-session)
			TOTAL 16				TOTAL 15

FALL			SENIOR YEAR		SPRING		
	HWRS 443A	3	Risk Assess for Env. Sys		**Tier2** Humanities[1]	3	*Gen Ed Elective*
	HWRS 417A	3	Fundamentals of Water Qual.		**HWRS 449**	3	Statistical Hydrology
	HWRS 498[3]	2	**Senior Capstone (OR other HAS Elective)**		**HWRS 482** [3]	3	Appl. Groundwater Modeling [**OR other HAS Elective**]
	Tier2 ARTS[1]	3	*Gen Ed Elective:*		**HWRS 498**[3]	2	**Senior Capstone 2nd semester**
	HWRS 405	3	Vadose Zone Hydrology		**Water Policy, Law, or Econ Elective Theme**	3	*Choose from: GEOG 468; AREC 479; POL 481 (fall).*
			TOTAL 14				TOTAL 14

100% Engagement course, notation on transcript

Highlighted Classes avail. at 500 level for students accepted to the Accelerated Master's Program (AMP) in Hydrology. A max of 12 units may fulfill both undergraduate & AMP requirements
Highlighted classes indicate courses that are ***possible*** to transfer from other academic institutions. A maximum of 64 units may be transferred and applied to a UA BS degree. Check with your advisor to ensure classes will transfer and fulfill degree requirements.

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[1] INDV/TRAD/ART/HUM courses must meet University general education requirements. ECON 210 is strongly recommended (see Sophomore Year, Spring Semester). One course must be recognized by the university as focusing on non-western culture, race, gender, or ethnicity. TRAD 101 satisfies this requirement.

[2] TECHNICAL ELECTIVE options. Complete 1 course (minimum 3 units) with advisor approval. Tech elective courses may not be prerequisite to or equivalent to any required course. Students who wish to officially emphasize Surface Water, Groundwater, Water Quality, Water Resources, or Atmospheric Science may apply for an undergraduate certificate, see academic advisor for more information **Tech Electives include:**

- **Surface Water** – CE 427, RNR 417, CE 214, CE 323. (CE 214 and 323 are exceptions to prerequisite/equivalent rule.)
- **Groundwater** – HWRS 482, GEOS 302, GEOS Elective, GEOS 304, or HWRS 505 or 518 for advanced students who meet eligibility requirements.
- **Water Quality** – HWRS 480, CHEM 241a, MIC 205A & L, WSM 468, CHEE/CE476a
- **Water Resources** –HWRS 481, ENVS 444, ENVS 415, ENVS 454, HWRS 520, for advanced students who meet eligibility requirements.
- **Atmospheric Science –** ATMO 4XX* (Radar/Precip), ATMO 469A (Air Pollution I), ATMO 469B (Air Pollution II), ATMO 489 (Atmospheric Electricity), GEOS 412A (Ocean Sciences), GEOS 478(Global Change), for advanced students who meet the criteria GEOG 547(Global and Regional Climatology)

Additional electives in these categories may be available. **with advisor approval,**

[3] HAS MAJOR ELECTIVES (Advanced Courses in HAS) – Complete 3 courses: (1) HWRS 482; (2) GEOS 450; (3) HWRS 498; (4) CE 427; [5] RNR 403, 417, or 420; (6) ATMO 451B (Phys Met2); (7) ATMO 455: Intro to Remote Sensing HYDRO/ATMO, (8) ATMO 4XX*- Earth Systems. Consult Catalog and Schedule of Classes for semester of offering! The instructor must approve the Senior Capstone topic ≥ semester prior to enrollment; Honors students may complete an approved Senior Honors Thesis in lieu of the Senior Capstone course.

*ATMO 4XX indicates new courses that have not been created yet

HWRS 498: SENIOR CAPSTONE

Early consultation with the Undergraduate Coordinator is encouraged. Details of the Capstone experience are provided below.

TIMING The capstone is a two-consecutive-semester course that starts in Fall semester and concludes in Spring semester. During the following semesters or time periods, the student should:

- JUNIOR YR (Early Spring): Seek placement, either with a faculty research group or an appropriate external agency, and define—in consultation with the undergraduate coordinator or the Capstone course instructor—the project topic and scope of participation.
- JUNIOR YR (Spring): Students planning to enroll in the Honors section (HWRS 498H) must submit a research prospectus form to the Honors College in the semester prior to beginning their capstone. See: https://www.honors.arizona.edu/prospectus for details. The purpose of the Honors Thesis/capstone Prospectus is to encourage students to begin thinking about the thesis/capstone in a timely manner, and to ensure that students have secured the support of a faculty thesis/capstone advisor. It is an opportunity for the student and faculty advisor to put their shared expectations in writing, and to ensure that both parties agree on the research plan and desired outcomes. The Honors Thesis/capstone Prospectus is required in order to graduate with Honors. If you are intending to write a thesis but did not submit a prospectus prior to starting your work, please contact Melissa Sanson at melissaesanson@email.arizona.edu in order to discuss your next steps. You can access the Honors Capstone Prospectus form here: https://arizona.app.box.com/s/cvgm4yya85sn9l7zt2p4b46ob2mdhhuz
- JUNIOR YR (SPRING OR SUMMER): Initiate work on the project. Work on the project may be ongoing activity, and, in some cases, longer than one semester. Enrollment is not required at this time.
- SENIOR YR (FALL): Enroll in the first semester of the Capstone course (HWRS 498, 2 units; HWRS 498H, 3 units) and actively engage in the project in anticipation of the final written and oral report preparation.
- SENIOR YR (SPRING): Enroll in the second semester of the Capstone course (HWRS 498, 2 units; HWRS 498H, 3 units). and actively engage in the project in anticipation of the final written and oral report preparation. Presentation of project (usually poster format) occurs during Spring semester at the HAS Department's Annual Student Research Exposition, *El Día del Agua y la Atmósfera.*

PLACEMENT Each student is responsible for securing placement:

- With a faculty research group or external agency (consult the Capstone instructor for suggestions).
- When possible, the department will assist a student in securing placement with a project or agency.

PURPOSE Participation in the capstone experience:

- Helps a student develop collaborative learning skills in a real-world setting.
- Promotes a closer relationship between a student and his or her faculty supervisor(s).
- Fosters mentoring by professionals working in the field of hydrology and water resources.
- Encourages problem-solving from a broader perspective, that is, knowledge of, and planning for, multiple objectives.
- Helps a student improve his or her report preparation and oral communication skills.

WRITTEN AND ORAL REPORTS The written and oral reports should include:

- Comprehensive overview of the project itself.
- Detailed account of the student's contribution to the project.
- Proper technical report format required.
- Routine laboratory assignments or positions where students have little or no knowledge of the project do not qualify for Capstone credit.

GRADING The final grade:

- Will be issued when both the oral presentation and a written report have been completed and submitted.
- Will be assigned by the Capstone instructor, not the faculty supervisor or agency supervisor/mentor.
- A final grade of C or better is required if Quality Point grades are to be issued (A=4,B=3, etc.) for all students enrolled in the capstone course.
- Will be submitted upon satisfactory completion of all requirements.
- Will not be issued unless all Capstone requirements have been met (no partial credit).