Advanced Academic Programs
Zanvyl Krieger School of Arts and Sciences
Johns Hopkins University

AS.420.676.81 – Global Scarcity in Freshwater Systems: Crisis and Solutions
Spring 2018

Course and Instructor Information

Instructor Information
Instructor: Glenn Patterson
Telephone Number: (970)586-5196
Email Address: gpatter5@jhu.edu

Course Description
Robert Fulghum said “Water is everywhere and in all living things; we cannot be separated from water. No water, no life. Period.” We all depend on water for our very existence, yet access to clean freshwater is one of the most pressing global issues of the 21st century. About four in ten people on the earth live in areas with frequent water scarcity. According to the World Commission on Water, it is likely to rise to five in ten—half the world’s population—by the year 2025. And where freshwater is scarce for people, it is also scarce for aquatic ecosystems. According to National Geographic, more than 20 percent of the 10,000 known freshwater fish species have become extinct or imperiled in recent decades.

This graduate-level course explores the dual nature of water scarcity worldwide, including both natural and human causes, and what is being done to help people and ecosystems cope with scarcity. The course covers definitions of water scarcity, the geographic extent of the problem, and trends in factors that contribute to it. It also examines several types of actions that are being taken to deal constructively with water scarcity. These actions fall into the general categories of monitoring, supply enhancement, conservation, re-use, pollution control, lifestyle changes to lower our water footprint, and public policy changes. Many of these actions, especially those related to public policy, are incorporated into seven principles of sustainable water management detailed in the course textbook, “Chasing Water: A guide for moving from scarcity to sustainability”, by Brian Richter of the Nature Conservancy. Examination of the principles helps to end the course on a hopeful note by reminding us that humans collectively use only 5-10 percent of the water that falls as precipitation, and we have the capacity to greatly reduce the human suffering and environmental damage caused by poorly managed use of freshwater resources.

Course Goals & Learning Objectives
By the end of this course, you will be able to:

- Identify and explain the nature, causes, types, and geographical extent of water scarcity
- Apply technical and institutional strategies for coping with water scarcity.

Course Materials

Textbook/s
The following texts are required for this course:

- Chasing Water: A Guide for Moving from Scarcity to Sustainability, by Brian Richter, Island

**Specific Technology Requirements & Skills for this Course**

This course requires the use of a computer that complies with the following hardware specifications:

Learning online requires some basic knowledge of computer technology. At a minimum, you need to be able to:

- Navigate in and use Blackboard; the Blackboard Student Orientation course on your “My Institution” page
- Create and save MS Word documents; review [MS Word training and tutorials](#) for PC users (all versions); [Word Help](#) for Mac users
- Find basic resources on the Internet
- Create and organize files & folders on your computer
- Send, receive, and manage email

**Assignments and Grading Policy**

**Assignments**

In the table below, you will find a brief description of the various assignments in this course including due dates assignment weights, and frequency.

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Due Dates</th>
<th>Assignment Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quizzes: 5 quizzes (25 points each)</strong></td>
<td>Week 4, Week 6, Week 8, Week 12, Week 14</td>
<td>125 points</td>
</tr>
<tr>
<td>Quizzes are open-book, with no set time limit, but you may take each quiz only once.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Discussions: 3 (25 points each)</strong></td>
<td>Week 3, Week 11, Week 13</td>
<td>75 points</td>
</tr>
<tr>
<td>The 3 roundtable discussions are an important part of the course, and you will be expected to participate by posting your well-thought-out response and by commenting on at least one other student’s post. The goal of the discussions is to let you share the insight you have gained about how science and public policy have come together to help solve watershed management problems. The problems do not have easy answers, and there is room for varying opinions in the discussions, as long as the opinions are supported.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Semester Project (200 points) graded in 8 parts</strong></td>
<td>See lessons</td>
<td>200 points</td>
</tr>
<tr>
<td>The 8-part research and writing assignment is a semester-long project in which each part, graded separately, builds on the</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
previous parts. You will select a water scarcity problem somewhere in the world, describe it in quantitative terms, and describe the potential application of tools to mitigate the problem. The product will be a scholarly paper that demonstrates your ability to analyze and solve technical and institutional aspects of water scarcity problems.

1. Topic Selection – a water scarcity issue (20 points)
2. Classification as to type of scarcity and type of water resource (25 points)
3. Problem description including quantitative data and trend information (50 points)
4. Potential application of “water toolbox” tools (30 points)
5. Potential modifications to governance (20 points)
6. Potential application of the 7 principles for water sustainability (20 points)
7. Summary (20 points)
8. Bibliography (15 points)

Total  400 points

Grading Policy

Letter Grade  Percentage
A+  98% to 100%
A   94% and less than 98%
A-  90% and less than 94%
B+  88% and less than 90%
B   84% and less than 88%
B-  80% and less than 84%
C   70% and less than 80%
F   0% and less than 70%

This course will follow the Advanced Academic Programs Grading Policies.

Assignment Submission
Students are required to adhere to the following guidelines when submitting written work:
- Use APA format
- Adhere to word limits for each assignment
- Cite sources properly

Assignment Feedback
The instructor will aim to return assignments to you within 5-7 days following the due date, depending on the length of the assignment. You will receive feedback in the My Grades area of the course which can be accessed via the navigation menu.

Late Policy
You are expected to contact your instructor in advance if you think you cannot meet an assignment deadline. Assignments turned in more than 2 days after the posted due date will be accepted, but the score will be discounted by 10%, unless prior arrangements are made with the instructor.

**Time Management Expectations**
It is expected that you look ahead to schedule your time. Plan to complete coursework across several days of the week rather than all in one day. Be sure to consider how group activities impact your schedule as well.
Some assignments require that you work on them for multiple weeks. Be sure to review the assignment directions at the beginning of the course so that you can plan your time accordingly. Please seek help before becoming frustrated and spending a significant amount of time to resolve an issue.

**Directions for Students**

**Next Steps:** Carefully review the remaining sections of the syllabus before beginning the first week’s activities, which are located in the Lessons area of the navigation menu in your online course.

Once you feel that you are ready to dive into the first week’s activities, select Lessons on the navigation menu. Then, select Week 1 to begin.

**About Your Course**

**What To Expect in this Course**
This course is 15 weeks in length and includes individual, group, and whole group activities in a weekly cycle of instruction. Each week begins on a Sunday and ends on the following Saturday. Please review the course syllabus thoroughly to learn about specific course outcomes and requirements. Be sure to refer to the Checklist each week, which provides a week-at-a-glance and shows targeted dates for the completion of activities.

**Course Policies**

**Course Participation**

**Participation Requirements**
You are expected to log into Blackboard regularly throughout the week - a daily check-in is recommended. It is your responsibility to read all announcements and discussion postings within your assigned forums. You should revisit the discussion multiple times over the week to contribute to the dialogue.

**Online Etiquette**
In this course, online discussion will primarily take place in our online discussion board. In all textual online communication, it is important to follow proper rules of online etiquette... communicating with others in a proper and respectful way. For helpful tips, please these Ground Rules for Online Discussions.

**Course Protocols and Getting Help**

**Amendments to the Course**
Changes to the course will be posted in the Announcements section of your course. Please check announcements every time that you log into your online course.
Course Communication
You should communicate often with your classmates and the instructor. The majority of communication will take place within the Discussion forums. When you have a question about an assignment or a question about the course, please contact your instructor, or post your question in the course’s “Syllabus & Assignment Question” forum.

Email Communication
For questions regarding course activities and assignments that would be general interest to other students, please post those in the Discussion forum. If you have a question regarding course activities and assignments of a personal nature, please send an email message to the instructor and observe the following guidelines:

- Include the title of the course in the subject field (e.g., JHU Insert Name of Course).
- Keep messages concise, and check spelling and grammar.
- Sign your full name (the sender’s email is not always obvious).

Feel free to contact your instructor with comments, questions, and concerns. All email messages will be sent to you via your JHU email account, so you should be in the habit of checking that account every day or you should ensure that your JHU email account forwards messages to another account of your choice.

Email messages will be responded to within 24-48 hours.

University Policies

General
This course adheres to all University policies described in the academic catalog. Please pay close attention to the following policies:

Students with Disabilities
Johns Hopkins University is committed to providing reasonable and appropriate accommodations to students with disabilities. Students with documented disabilities should contact the coordinator listed on the Disability Accommodations page. Further information and a link to the Student Request for Accommodation form can also be found on the Disability Accommodations page.

Ethics & Plagiarism
JHU Ethics Statement: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor. Read and adhere to JHU’s Notice on Plagiarism.

Dropping the Course
You are responsible for understanding the university’s policies and procedures regarding withdrawing from courses found in the current catalog. You should be aware of the current deadlines according to the Academic Calendar.

Getting Help
You have a variety of methods to get help. Please consult the help listed in the "Blackboard Help" link in
the online classroom for important information. If you encounter technical difficulty in completing or submitting any online assessment, please immediately contact the designated help desk listed on the AAP online support page. Also, contact your instructor at the email address listed atop this syllabus.

**Copyright Policy**
All course material are the property of JHU and are to be used for the student's individual academic purpose only. Any dissemination, copying, reproducing, modification, displaying, or transmitting of any course material content for any other purpose is prohibited, will be considered misconduct under the JHU Copyright Compliance Policy, and may be cause for disciplinary action. In addition, encouraging academic dishonesty or cheating by distributing information about course materials or assignments which would give an unfair advantage to others may violate AAP’s Code of Conduct and the University’s Student Conduct Code. Specifically, recordings, course materials, and lecture notes may not be exchanged or distributed for commercial purposes, for compensation, or for any purpose other than use by students enrolled in the class. Other distributions of such materials by students may be deemed to violate the above University policies and be subject to disciplinary action.

**Code of Conduct**
To better support all students, the Johns Hopkins University non-academic Student Conduct Code has been integrated and updated to include all divisions of the University. In addition, it is important to note that all AAP students are still accountable for the Code of Conduct for Advanced Academic Programs.

**Title IX**

Confidentiality and Mandatory Reporting
As an instructor, one of my responsibilities is to help create a safe and inclusive learning environment on our campus. I also have mandatory reporting responsibilities related to my role as a Responsible Employee under the Sexual Misconduct Policy & Procedures (which prohibits sexual harassment, sexual assault, relationship violence and stalking), as well as the General Anti-Harassment Policy (which prohibits all types of protected status based discrimination and harassment). It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep information you share private to the greatest extent possible. However, I am required to share information that I learn of regarding sexual misconduct, as well as protected status based harassment and discrimination, with the Office of Institutional Equity (OIE). For a list of individuals/offices who can speak with you confidentially, please see Appendix B of the JHU Sexual Misconduct Policies and Laws.

For more information on both policies mentioned above, please see: JHU Relevant Policies, Codes, Statements and Principles. Please also note that certain faculty and other University community members also have a duty as a designated Campus Safety Authority under the Clery Act to notify campus security of certain crimes, as well as a duty under State law and University policy to report suspected child abuse and/or neglect.
Appendix A

Course Topics & Readings

The following are the selected readings for this course. All readings are required unless noted as optional. All readings unless otherwise noted are available from JHU ARES (eReserves) system.

Week 1: The pain of water scarcity

Topics: Course intro and overview, examples of water scarcity, gender and water scarcity, water scarcity, water quality, and human health
Readings: Richter, chapter 1; Pearce, chapter 3; articles on gender, water quality, and health.
Assignment: Discussion 1—Impacts of water scarcity.

Week 2: Physical water scarcity

Topics: Definition, extent, causes, examples of physical water scarcity.
Readings: Pearce, chapter 4
Assignment: R&W project step 1--Select a water scarcity problem somewhere in the world.

Week 3: Economic water scarcity

Topics: Definition, extent, causes, examples of economic water scarcity.
Readings: Articles on economic water scarcity.
Assignment: R&W project step 2-- Classify it as physical, economic, or both. Also classify as surface water, groundwater, or both.

Week 4: Taking stock of our water budgets

Topics: Distribution of water in the world, hydrologic cycle, watershed and aquifer basics, consumptive and non-consumptive use.
Readings: Richter, chapter 2
Assignment: Quiz 1.

Week 5: Stealing from the future: groundwater mining

Topics: Groundwater overdrafts, examples and impacts, Ogallala Aquifer.
Readings: Richter, pp. 30-33; Pearce, chapters 5, 6, and 8; Articles on Ogallala Aquifer and GW mining.
Assignment: R&W project step 3—Describe the problem.

Week 6: Water toolbox: Finding more water

Topics: Desalination, rain and fog harvesting, storage, importation.
Readings: Richter, chapter 3, Pearce, chapters 24, 27, 28, 29
Assignment: Quiz 2

Week 7: Water toolbox: Using less water

Topics: Virtual water and the water footprint, re-use, watershed management, and water conservation.
Readings: Pearce, chapters 1, 25, 33
Assignment: R&W project step 4-- What tools from the water toolbox could be used to help solve the problem?

Week 8: Applying the toolbox: Colorado River Basin
Week 9: How water governance leads to scarcity
Topics: Governance and ignoring needs of the poor, resource allocation in relation to wealth and power.
Readings: Richter, chapter 4
Assignment: R&W project, step 5—What aspects of governance need to be modified in order to mitigate this scarcity problem?

Week 10: Seven principles for sustainable water management
Topics: Richter's 7 principles for effective water governance and adaptive management.
Readings: Richter, chapter 5
Assignment: R&W Project, step 6—Which of the 7 principles for water sustainability could be applied?

Week 11: Water for the people
Topics: Water as a human right vs water as a commodity, case history of Cochabamba, governing the commons.
Readings: Richter, chapter 6, pp. 97-100; Pearce, chapter 34; articles and video clips about Cochabamba, Bolivia water wars; articles from the UN on water as a human right; article about commodification of water.
Assignment: Discussion 2—How can we reconcile the concepts of water as a human right and water as a commodity for profit?

Week 12: Case history on water sustainability in Texas
Topics: Examining the sustainability scorecard for water management in Texas.
Readings: Richter, chapter 6, pp. 100-109; Pearce, pp. 1-17; articles on water in Texas.
Assignment: Quiz 4

Week 13: Case history: Murray-Darling River Basin, Australia
Topics: Examining the sustainability scorecard for water management in the Murray-Darling Basin of Australia.
Readings: Richter, chapter 7; articles on the Murray-Darling River Basin.
Assignment: Discussion 3—Has the Murray-Darling Basin Authority struck an appropriate balance among demands for water?

Week 14: Chasing hope and water
Topics: Reasons for optimism about the future of sustainable water management, examples of progress being made.
Readings: Richter, chapter 8.
Assignment: Quiz 5

Week 15: Finish R&W Project
Assignment: R&W Project, steps 7 and 8—Summary and Bibliography