F. Program and Curriculum Design

Program Structure

The Bachelor of Arts (BA) Degree in Water Resources Management will be designed by an interdisciplinary committee including faculty from the Divisions of the Applied Technology, Transportation and Culinary Arts; Social Sciences, Human Development and Physical Education; Arts and Humanities; and lastly Mathematics, Business & Computer Technology. The aim and goal of the baccalaureate degree is to introduce students to the public policy decisions and statutory mandates that govern water demand, affect water supply, and impact water quality. The concentration in water resources management enables students to develop the knowledge and skills needed to apply organizational theories in leadership and integrated resource management; facilitate the complex nature of intergovernmental relations among local, state, federal and private organizations; interpret major policies, legislative acts and regulations governing water resources; analyze water policy issues and evaluate alternative policy solutions; explore financial management and budget forecasting functions; and facilitate the strategic planning and goal-setting process for water sector organizations. Employment for graduates occurs in a wide range of fields and sectors including private, non-profit and government agencies. Possible career paths include leadership roles in:

- Water supply utilities
- Water/wastewater treatment plants
- Regulatory agencies
- Groundwater and Conservation Districts
- Watershed/River Basin Authorities

For those who cannot or choose not to attend the main campus, over 99% of the program units can be completed by taking courses approved as distance education. Scheduling options include accelerated formats (i.e., eight, ten, and eighteen weeks).

Admission Requirements:

Upper Division Standing

1. Students interested in pursuing the Bachelor of Arts in Water Resources Management must meet the following requirements to be considered to have upper division standing:
    - Major courses: 25-30 semester units of courses from a designated associate degree course sequence per California Community College Chancellor's Office Taxonomy of Programs (TOP) codes 0958.00. In addition, environmental technologies coursework would also be applicable. Each course must be completed with a "C" or higher.
    - A minimum of 30 lower division semester units or 45 quarter units in general education from either the CSU GE or IGETC patterns with a 2.0 cumulative GPA. The 30 units must include the following courses, completed with a C or higher:
        - Written Communication
        - Oral Communication
        - Critical Thinking
        - Mathematics
2. Students must complete the CSU GE or IGETC pattern prior to earning the bachelor's degree. Students seeking admission to the Bachelor of Arts in Water Resources Management program must meet the requirements for upper division standing or submit the following documents:
    a. A minimum overall undergraduate grade point average of 2.0.
    b. Submission of an online application to San Bernardino Valley College.
    c. Submission of a letter of application stating the student's interests and goals.
    d. Submission of official transcripts* of all college-level course work to Admissions and Records.

*Applicants may submit unofficial transcripts for review by the departmental faculty. However, under college policy, admission decisions are contingent upon receipt of official transcripts.

Program Learning Outcomes:

Communication Skills: Comprehend content and communicate in written, spoken, signed, or artistic formats.

- Engage proactively with stakeholders and community decision makers to promote the utility provider as valued, competent, and trustworthy environmental stewards and the water infrastructure as community assets.
- Produce technical documents that respond to the needs of multiple audiences, including international/global audiences of water resources.

Quantitative Reasoning Skills: Apply mathematical or analytical skills to identify and solve problems and synthesize and evaluate ideas.

- Employ project management processes and analytical tools to achieve a sustainable outcome to regulatory compliance and environmental problems.
- Develop the skills of utilizing information technologies capabilities in water resources management to track performance, identify variability, and manage performance more effectively and precisely.

Critical Thinking Skills and Information Literacy: Critically evaluate qualitative and quantitative hypotheses, sources, and conclusions.

- Apply key terminology, facts, concepts, principles, historical perspectives and theories to effectively "supply water" and "manage wastewater" infrastructure functions.

Personal, Academic, and Career Responsibilities: Develop goals for personal, academic, and career environments.

- Gain comprehensive knowledge of integrated water resources management with specific emphasis on best practices leading to water sustainability and financial viability.
- Acquire skills to address contemporary issues related to water resources management and understand their societal, economic, and environmental impacts.

Social and Global Awareness: Recognize the impact of one's actions on the environment and one's role in society with respect to diversity, equity, inclusion, and anti-racism.

- Analyze social justice in the workplace and determine one's own self-concept based on the dimensions of diversity equity, inclusion, and anti-racism.
- Articulate the core concepts of sustainable management of water resources from local to state to national and global viewpoints.

BA Core Curriculum Areas of Study

The Bachelor of Arts Degree in Water Resources Management requires the satisfactory completion of 120 semester units. Included in the total unit requirement for this degree is a minimum of 48 semester units.

Core Curriculum Areas of Study:

1. **Foundational:** Clarifies the public administration framework and institutional competencies required in the water utility sector.
2. **Managerial:** Interprets foundations in effective utility management practices.
3. **Financial:** Examines financial contexts and public budgeting skills to ensure water resource sustainability.
4. **Analytical:** Simplifies the quantitative and qualitative data methods of research design for integrated water resource management.
5. **Applications**: Provides students with the opportunity to utilize concepts learned in the program via an internship, applied research project analyzing a problem or a comprehensive written examination.

Core Curriculum (48 Credits)

Core I (12 Units)

Foundational-Required Courses (12 units)

- Introduction to Water Resources Management (3)
- California Water History (3)
- Applied and Professional Ethics in the Water Sector (3)
- Technical and Professional Writing (3)

Foundational-Electives (18 units)

- Technology and Public Administration (3)
- Strategic Planning (3)
- Water Resource Economics (3)
- Water Law (3)
- International Environmental Policy (3)
- Native American Water Rights (3)

Core II (9 units)

Managerial-Required Courses (9 units)

- Managing Public Organizations (3)
- Water Resource Management and the Public Policy Process (3)
- Human Resources Administration in the Water Sector (3)

Managerial-Electives (6 units)

- Collective Bargaining and Labor Relations (3)
- Water Sector Leadership and Diversity (3)

Core III (3 units)

Financial-Required Courses (3 units)

- Capital Budgeting and Debt Management Systems (3)

Core IV (6 units)

Analytical-Required Courses (6 units)

- Applied Statistics (3)
- Research Methods in Water Resources Management (3)

Analytical-Elective (6 units)

- GIS and Data Analysis in Water Resources (3)

Core V (6 units)

Application-Required Courses (6 units)

- Internship (3)
- Applied Research Project (3)

Core V (6 units)

Application-Elective

- Comprehensive Written Exam (3)

I. Lower Division Coursework

Thirty-five units or more of environmental technologies related courses from a designated associate degree course sequence per California Community College Chancellor's Office Taxonomy of Programs (TOP) codes 0958.00 Water and Wastewater Technology. In addition, environmental technologies coursework would also be applicable. Each course must be completed with a C or higher.

Environmental technologies programs at San Bernardino Valley College include:

- Water Technology Associate of Science Degree
- Water Supply Technology Certificate of Achievement

II. Upper Division Coursework (Major)

WRM XXX Introduction to Water Resources Management Credits: 3.00
Modality: Online or In Person

Description:
This introductory course is set within the context of the political, social, and economic realities of water utility management. It examines the policies and processes of democratic governance of water supply and sanitation services from a multidisciplinary perspective. In this course, students are introduced to the field and profession of public administration. Students also develop a broad understanding of the public sector while learning to think and act as an ethical public administration professional.

WRM XXX Applied and Professional Ethics in the Water Sector Credits: 3.00
Modality: Online or In Person

Description
This course is a study of effective leadership attributes and practical issues related to ethical and community decision making in the water utility sector. Emphasis is placed on proactive engagement with stakeholders (internal and external), analysis of ethical problems, the development of analytical skills and values framework to act ethically in public service roles.

WRM XXX California Water History Credits: 3.00
Modality: Online or In Person

This course provides the water technology student with a detailed practical study of water resource management history along with the integration of regulatory and reliability requirements consistent with customer, public health, ecological, and economic needs. Topics include treated drinking water, treated wastewater effluent, recycled water, stormwater discharge, and recovered resources (e.g., energy, nutrients, biosolids). Current water industry best practices and relevant case studies will be discussed and demonstrated throughout the course. Emphasis will also be placed upon the advent of new and emerging technologies used in the production of "fit for purpose" water.

WRM XXX Water Resources Management and the Public Policy Process Credits: 3.00
Modality: Online or In Person

Description:
This course acquaints students with the public trust framework and policy processes for developing and analyzing a range of water policy areas and issues. Students will examine the public policy process from various theoretical and practical perspectives that govern water infrastructure management. Students will also be able to differentiate the policy types (technical, legal, and financial) associated with the management of water related projects and programs. Additional topics explored include policy development, organizational theory and behavior, stakeholder relations, and other relevant issues for water sector managers.

WRM XXX Technology and Water Resources Management Credits: 3.00
Modality: Online or In Person

This course explores the implications of information systems software typically employed in water sector infrastructure and impact the day-to-day operations. Additional emphasis will be placed on operational technology developments (automated and smart systems), digital cloud-based information platforms (customer service and asset management), as well as cybersecurity awareness. These systems and capabilities are available across all areas of utility management and can substantially improve the ability of utilities to track performance in real time, identify variability, and manage performance more effectively and precisely. Students will also examine how water policy and technology intersect, through the use of environmental indicators.

WRM XXX Strategic Planning Credits: 3.00
Modality: Online or In Person
Advisory: WRM XXX Water Resources Management and the Public Policy Process
WRM XXX Managing Public Organizations

Description
Students will explore the process by which water identify strategic goals and objectives to effectively manage a full range of business risks (including interdependencies with other services and utilities, legal, regulatory, financial, environmental, and safety) consistent with industry trends and system reliability goals. Students will also develop plans for potential water resource variability (e.g., changing weather patterns, including extreme events, such as drought and flooding), and engage in long-term integrated water management approaches to ensure current and future customers, community, and societal water needs are met.

WRM XXX Managing Public Organizations Credits: 3.00
Modality: Online or In Person

Description
This course explores the legal constraints associated with managing water sector organizations and the political processes of bureaucracy, decision making, and control. The focus is on intergovernmental arrangements, governmental processes, and policies for water resources. Theoretical foundations and techniques of program evaluation including need assessments, outcome evaluations, surveys, program outcomes, and impact evaluation(s) are examined with special attention given to strategic interventions of change.

WRM XXX Human Resources Administration in Public Organizations Credits: 3.00
Modality: In Person or Online

Description
This course explores human resource policy, including procedures and principles of personnel administration in the water sector. The traditional aspects of personnel administration including recruiting, job classification, evaluation, and compensation and dynamic topics include staffing, workforce diversity, drug abuse, whistle blowing, sexual discrimination, and other relevant issues are covered. Behavioral and other societal determinants are examined, such as demographics, economics, community sustainability, water service purveyor mandates, government regulations and/or policies.

WRM XXX Collective Bargaining and Labor Relations Credits: 3.00
Modality: In Person or Online
Advisory: WRM XXX Human Resources Administration in Public Organizations

Description
This course examines the contexts, and processes of employer/employee relations in the public water sector. Among the topics addressed are labor law, union structure and organizing, processes of collective bargaining (work rules, legislative statutes, adjudication, mediation, arbitration) and labor-management cooperation. Changes in the application of labor laws due to court decisions, National Labor Relations Board (NLRB) rulings, and changes in the environment of union and management relations are also covered throughout the course.

WRM XXX Water Sector Leadership and Diversity Credits: 3.00
Modality: In Person or Online
Advisory: WRM XXX Human Resources Administration in Public Organizations

Description
This course introduces students to essential leadership roles and team building characteristics required of professionals within the water sector. Emphasis is on acknowledging the impacts of diversity on group dynamics transforming organizational norms to ensure a purposeful commitment to the strategic challenge of maintaining organizational diversity. Students will also explore strategies for promoting social justice.

WRM XXX Capital Budgeting and Debt Management Credits: 3.00
Modality: Online or In Person
Advisory: WRM XXX Managing Public Organizations

Description
This course examines concepts, principles, processes, and practices in governmental budgeting at national, state, and local levels and the interrelationships of planning, programming, and budgeting strategies. Topics include capital improvement plan and budgeting, administration of grant programs from state and federal agencies, conductance of water audits to mitigate unaccounted water loss, and increases to operating revenues through negotiated water rates. Operations and maintenance expenditures, debt management practices, and the debt issuance process in the municipal bond market will also be explored.

WRM XXX Water Law Credits: 3.00
Modality: In Person or Online

Description
This course explores the law and policies for securing and using water rights, allocation of water resources and the administrative systems for water quality management. Students will examine the prior appropriation doctrine, groundwater management regimes, federal water management, regulation plus the firming up of rights by grant, contract, compulsory purchase, tics, and prescription firming up of rights by grant, contract, compulsory purchase, and prescription. The course will also review interstate water disputes, tribal water rights matters and other legal constraints on the use and governance of water. Specific issues to be examined range from facilitating water markets to promoting water conservation, recycling, and wastewater reclamation in many Western states.

WRM XXX Water Resource Economics Credits: 3.00
Modality: In Person or Online

Description
The course is an introduction to economic theory emphasizing the application of selected micro-economic and macroeconomic theories to issues in water resources management. Students will examine theoretical development of access constraints affecting water demand and supply. Explores the effects of energy extraction and production along with climate change on water resources, concerns for endangered species, and economic approaches to mitigate these societal and environmental impacts.

WRM XXX International Environmental Policy Credits: 3.00
Modality: In Person or Online

Description
This course introduces students to contemporary international environmental problems from theoretical and policy perspectives to understand the cause of environmental problems. Students will investigate strategies used to address a nation's problems, recognizing failure and success. Additionally, students will examine national security and economic stability in light of the environmental policies in place, particularly those policies related to water.

WRM XXX Native American Water Rights Credits: 3.00
Modality: In Person or Online
Advisory: WRM XXX Water Law

Description
This course covers the scope of tribal, federal, state, and regional authorities to regulate or affect the development of Native American Lands established by statute or treaty, tribally and individually owned. Students will explore the philosophical background and water rights litigation case law for advancing water rights negotiations for tribes. Emphasis will be placed on the nature of the federal-tribal trust relationships and the doctrine of reserved rights as it applies to water along with the engineering and economic requirements for water delivery.

GIS XXX GIS and Data Analysis in Water Resources Credits: 3.00
Modality: In Person

Description
This course introduces students to the fundamentals of geographic information systems (GIS), applied visual data systems, geographic data sources, vector and raster models, and spatial analysis. Students learn database management plus digital cartography using popular GIS software.

ENGL XXX Technical Writing in Water Resources
Modality: In Person or Online Credits: 3.00

Description
This course examines the advanced analytical approaches for strategic written, presentation, and interpersonal communication in organizational and regulatory contexts. Special attention is paid to public policy themes and issues, such as resource sustainability, environmental justice, and global climate change. Focus is also on the practical methods that advance leaders' abilities to inform, engage, persuade, and influence non-specialist audiences such as the public and policymakers. Students will also learn, through practice, essential writing guidelines to produce easily read and clearly understood technical documentation.

MATH XXX Applied Statistics in Water Resources Credit 3.00
Modality: In Person

Description
Statistical tools and techniques used in public policy analysis and integrated water management decision-making. Introduces the basic principles and issues relevant to the understanding of data sources and research. Students gain an overview of the basic concepts of statistics by exploring the world of descriptive statistics, probability, and inferential statistics. Covers central tendency, variability and frequency distribution, hypothesis testing, mean comparison with significance testing, graphing data, correlation, cross-tabulation, introduction to multivariate linear regression, and the basic ideas of experimental design.

Experiential Learning

Internships provide students at all levels with opportunities to gain experience and build professional networks outside the classroom. Undergraduate students are strongly encouraged to complete an internship as part of their degree program.

WRM XXX Internship Credits: 3.00
Modality: In Person

Description
Students are required to spend one full semester as interns in an approved internship program. The internship provides students with practical experience, which allows them to integrate theory with "real world" situations. During the internship students work under the supervision of a qualified professional in industry or government fulfill various assignments to acquire first-hand knowledge of a working environment. In addition to this professional supervision, each student is assigned an academic advisor to ensure that an appropriate level of support from and contact with the

university is given to the student during the training period. Students are required to draft a final formal report, that documents and details the technical aspects of the work undertaken during their internship.

Applied Learning

WRM XXX - Research Methods in Water Resources Management Credits 3.00
Modality: In Person

Description
Discussion of the processes of scientific research and research design as applied to modern water resources management. Includes scientific approaches to field, research and professional ethics, writing, and public presentation. Students will research a topic and use documented evidence to support a paper written in the style applicable to their field of study.

WRM XXX Capstone Project Credits: 3.00
Prerequisites: Applied Statistics, Applied Research Design

Description
This course encourages students to integrate knowledge and skills from across the BA curriculum to develop a research paper that demonstrates the core competencies of the water resource management discipline.

WRM XXX Comprehensive Exit Exam Credits: 3.00
Modality: In Person

Each student will have the option of taking a written comprehensive examination. The purpose of the exam is to ensure undergraduate students have a strong foundational understanding of core subjects in water resources management. The comprehensive examination is evaluated as "Pass" or "Repeat" based on demonstrated proficiency in core concepts examined in an essay format. To qualify for taking the comprehensive examination, a student must have completed all required, core courses for the BA degree. If a student follows the recommended schedule for both full-time and part-time students, then the comprehensive exam is taken in the semester of graduation alongside elective courses. The comprehensive examination is evaluated by the professor of the BA Capstone and two other faculty members.

Upper Division Course Sequence

Program students are required to complete the "(ENGL XXX) Technical Writing in the Water Sector" course which offers a strong grounding in technical and professional writing upon entry into the program. Welcome to the wonderful world of water resource management! The first and second semesters of the program students will literally "dip their feet" into water history, resource planning, and ethics. During the second and third semester, effective utility management practices will evolve in the form of public policy, organizational leadership, and finance. Students also have the option throughout the first three semesters to "sprinkle" their education plan with a few electives, examining course work in informational technologies, economics, law, and environmental policies. For the culminating experience, integration of the foundational, managerial, financial, and analytical concepts learned from the courses of study can be demonstrated through an applied research project or comprehensive written examination.

CODE	TITLE	UNITS
Required Courses		
WRM XXX	Introduction to Water Resources Management	3
WRM XXX	California Water History	3
WRM XXX	Applied and Professional Ethics in the Water Sector	3
ENGL XXX	Technical and Professional Writing	3
WRM XXX	Managing Public Organizations	3
WRM XXX	Water Resource Management and the Public Policy Process	3
WRM XXX	Human Resources Administration in the Water Sector	3
WRM XXX	Capital Budgeting and Debt Management Systems	3
MATH XXX	Applied Statistics	3
WRM XXX	Research Methods in Water Resources Management	3
WRM XXX	Internship	3
Required Course: and		
WRM XXX	Applied Research Project	3
Required Course: or		
WRM XXX	Comprehensive Written Exam	3
Total Required Units:		**36**
Select four courses from the list below:		
WRM XXX	Technology and Public Administration	3
WRM XXX	Strategic Planning	3
WRM XXX	Water Resource Economics	3
WRM XXX	Water Law	3
WRM XXX	International Environmental Policy	3
WRM XXX	Native American Water Rights	3
WRM XXX	Collective Bargaining and Labor Relations	3
WRM XXX	Water Sector Leadership and Diversity	3
WRM XXX	GIS and Data Analysis in Water Resources	3
Total Elective Units		**12**
Total Degree Units:		**48**

Course Sequence

Semester One

WRM XXX Introduction to Water Resources Management (3 units)
WRM XXX California Water History (3 units)
WRM XXX Applied and Professional Ethics in the Water Sector (3 units)
ENGL 3XX Technical and Writing in the Water Sector (3 units)
WRM XXX Elective (3)

Semester Two

WRM XXX Managing Public Organizations (3 units)
WRM XXX Water Resources Management and the Public Policy Process (3 units)
WRM XXX Human Resources Administration in the Water Sector (3 units)
WRM XXX Capital Budgeting and Debt Management Systems (3 units)
WRM XXX Elective (3)

Semester Three

MATH XXX Applied Statistics (3 units)
WRM XXX Elective (3)
WRM XXX Elective (3)

Semester Four

WRM XXX Internship (3 units)
WRM XXX Applied Research Project (3 units)
WRM XXX Research Methods in Water Resources Management (3 units)
WRM XXX Comprehensive Written Exam (3 units)