Regional Colleges

Biotechnology Programs
&
Medical Laboratory Technology Programs

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MiraCosta College
Mt. San Jacinto College
San Diego City College
San Diego Miramar College
Southwestern College

MiraCosta College

Biotechnology

Awards & Certificates

Associate in Arts Degree
Research and Development
Students may earn the above-named associate degree by completing a certificate of achievement and the general education courses required for MiraCosta College's Associate in Arts degree (see Associate Degrees p. 50). Students should meet with a MiraCosta counselor to identify required courses and to develop a written educational plan for the specific degree or certificate they wish to earn.

Certificate of Achievement
Bioprocess Technology
This certificate provides a foundation in, and practical application of, the technologies employed by biotechnology companies engaged in the production of cell-derived products from small to large scales. Through a combination of applied lecture and hands-on laboratory instruction, students acquire the confidence, competence, and compliance for technical work in a regulated environment. Bioprocess technologies encompass the operation of specialized equipment and instrumentation used to produce biopharmaceuticals or reagents utilized by biotechnology, pharmaceutical, and academic research labs. Students learn to grow a variety of cells, express a biomolecule of interest, and recover the desired biomolecule through a series of purification steps. They learn to follow good manufacturing practices by maintaining records in order to comply with quality system requirements and government regulations. This certificate is designed for bioprocess-technician skill development as well as professional development for those already employed in the industry.
Required courses:
BTEC 110 Basic Techniques in Biotechnology 4
BTEC 120 Business and Regulatory Practices in Biotechnology 3
BTEC 211 Technical Writing for Regulated Environments 1
BTEC 221 Bioprocessing: Cell Culture and Scale-up 1.5
BTEC 222 Bioprocessing: Large Scale Purification 1.5
Select at least one course from the following: 1
BTEC 210 Data Analysis with Excel
BTEC 292 Internship Studies

Certificate of Achievement
Research and Development
The Research and Development certificate is designed to meet the increasing need for entry-level laboratory technicians, especially in the field of research and development. Technicians in this field must be proficient in the application of scientific methodology to solve problems. They must learn and implement laboratory procedures and use specialized laboratory equipment. Competency in organizational, computational and communication skills is required. This three semester program is designed to give students the theoretical background and practical experience necessary to be an effective laboratory technician as well as to prepare them for upper division course work in the biosciences. Graduates of this biotechnology program can expect to be employed in various capacities, including quality control, quality assurance, production, applied research, product development, analytical testing, and academic (basic) research.
Required courses:
BIO 100 General Biology (Lecture and Lab) 3-4
or BIO 101 General Biology or BIO 105 Genes and Technology in Society
BTEC 110 Basic Techniques in Biotechnology 4
BTEC 120 Business and Regulatory Practices in Biotechnology 3
BTEC/BIO 180 Biostatistics 4
CHEM 108 Preparatory Chemistry 3
CHEM 110 General Chemistry 5
CHEM 111 General Chemistry 5
CSIT 110 Computer Applications 1-3
or CSIT 115 Intermediate Computer Applications
or CSIT 128 Microsoft Excel for Business
or BTEC 210 Data Analysis with Excel
ENGL 100 Composition and Reading 4
MATH 64 Intermediate Algebra 4
Select at least 4 electives from below: 4-5
BTEC 201 Advanced Cell Culture
BTEC 203 Techniques in DNA Amplification
BTEC 204 Recombinant DNA
BTEC 206 Principles of Separation and HPLC
BTEC 207 Techniques in Immunochemistry and ELISA
BTEC 211 Technical Writing for Regulated Environments 1

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BTEC 299 Occupational Cooperative Work Experience
Total Units 12

Certificate of Proficiency
Laboratory Skills
This certificate is designed to meet the increasing need for trained and competent associates in laboratory environments. The required courses provide students with fundamental laboratory skills to start or enhance a career in the biosciences. Students completing this certificate can expect employment utilizing their technical skills in the performance of tests and routine tasks inherent to a wide range of laboratory environments. This certificate is intended for the development of general laboratory skills as well as professional growth for those already employed in the industry.
Required courses:
BTEC 110 Basic Techniques in Biotechnology 4
BTEC 120 Business and Regulatory Practices in Biotechnology
Select at least four courses from the following: 4-5
BTEC 201 Advanced Cell Culture
BTEC 203 Techniques in DNA Amplification
BTEC 204 Recombinant DNA
BTEC 206 Principles of Separation and HPLC
BTEC 207 Techniques in Immunochemistry and ELISA
BTEC 210 Data Analysis with Excel
BTEC 211 Technical Writing for Regulated Environments
BTEC 221 Bioprocessing: Cell Culture and Scale-up
BTEC 222 Bioprocessing: Large Scale Purification
BTEC 230 Techniques in Biofuels Production and Analysis
BTEC 292 Internship Studies
BTEC 299 Occupational Cooperative Work Experience
Total Units 11-12

Course Descriptions from 2013-2014 Catalog

BTEC 110: Basic Techniques in Biotechnology
Units: 4
Prerequisites: None
Advisory: Eligibility for ENGL 100; MATH 64; CHEM 108; and BIO 100 or BIO 101 or BIO 105.
Acceptable for Credit: CSU
Lecture 2 hours, laboratory 6 hours. (0430.00)
This course focuses on the basic laboratory skills needed for employment in the bioscience/biotechnology industry. Students learn laboratory safety and documentation while acquiring skills in the maintenance and calibration of basic lab equipment, calculation and preparation of lab solutions and media, and routine handling of both bacterial and mammalian cell cultures (tissue culture). Students also develop fundamental skills in spectroscopy, centrifugation, performance of assays, gel electrophoresis, and the purification and handling of biological molecules, such as proteins and DNA.

BTEC 120: Business and Regulatory Practices in Biotechnology
Units: 3
Prerequisites: None
Acceptable for Credit: CSU
Lecture 3 hours. (0430.00)
This course examines basic business principles and practices utilized in the discovery, development, and production phases of new product development. It explores the role of governmental oversight and regulation in assuring the safety, efficacy, and quality of a biotechnology product.

BTEC 180: Biostatistics
Units: 4
Prerequisites: MATH 64 or eligibility determined by the math placement process.
Advisory: BIO 100 or BIO 101.
Enrollment Limitation: Not open to students with credit in BTEC 180, BIO 180, PSYC 104, PSYC 104H, SOC 104, or SOC 104H.
Acceptable for Credit: CSU, UC Credit limitation

BTEC 210: Data Analysis with Excel
Units: 1
Prerequisites: None
Advisory: Working knowledge of desktop computing.
Acceptable for Credit: CSU
Lecture 1 hour. (0430.00)
This course teaches how modern spreadsheet programs can be used to collect and organize data for subsequent tabulation, summarization, and graphical display. This course will utilize various forms of scientific data to teach the techniques and skill that facilitate the capture, analysis, and management of data. Topics covered include importing and organizing data, filtering and sorting, graphing, and statistical analysis functions.

BTEC 211: Technical Writing for Regulated Environments
Units: 1
Prerequisites: None
Advisory: Eligibility for ENGL 100.
Acceptable for Credit: CSU
Lecture 1 hour. (0430.00)
This course will provide the requisite tools to understand why technical writing exists and how that writing works in conjunction with the many types of documents that exist in regulated environments. Further, the course develops the tools you need to deliver clear and complete passages with precise language. Best practices for technical writing will be applied to a variety of documents including reports, standard operating procedures (SOP), and investigations.

BTEC 221: Bioprocessing: Cell Culture and Scale-up
Units: 1.5
Prerequisites: None
Advisory: BTEC 110; BTEC 120; Eligibility for ENGL 100.
Enrollment Limitation: Not open to students with credit in BTEC 220
Acceptable for Credit: CSU
Lecture 0.75 hour, laboratory 2.25 hours. (0430.00)

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Lecture 3 hours, laboratory 3 hours. (0430.00)
This introductory statistics course covers the principles and practice of statistical design and analysis for scientific experimentation. Topics include hypothesis formation, experimental design and execution, data analysis, and communication with application to scientific fields, such as the biological and health sciences. The course includes laboratory application with extensive use of computer software for statistical analysis and simulation. UC CREDIT LIMITATION: Credit for BIO 180/BTEC 180, MATH 103, PSYC 104/SOC 104 or PSYC 104H/SOC 104H.

BTEC 201: Advanced Cell Culture
Units: 1
Prerequisites: None
Advisory: BTEC 110.
Acceptable for Credit: CSU
Lecture 0.50 hour, laboratory 1.50 hours. (0430.00)
This advanced course teaches skills in the proper handling of cells from higher organisms, such as plants, mammals, and insects, that are routinely maintained in culture in the biotechnology laboratory. Instruction focuses on growth and manipulation techniques and long-term maintenance of various laboratory cell cultures that may include anchoragedependent and suspension cell lines as well as stem cell cultures.

BTEC 203: Techniques in DNA Amplification
Units: 1
Prerequisites: None
Advisory: BTEC 110.
Acceptable for Credit: CSU
Lecture 0.75 hour, laboratory 0.75 hour. (0430.00)
This advanced course is designed to provide skills in the performance of the polymerase chain reaction (PCR), a technique commonly used to amplify DNA in forensics and the biotechnology laboratory. Instruction will focus on understanding the process; potential applications of DNA amplification; and the skills related to the set up, performance, and evaluation of the outcome of the technique. The course assumes prior knowledge of solution preparation and gel electrophoresis.

BTEC 204: Recombinant DNA
Units: 1
Prerequisites: None
Advisory: BTEC 110.
Acceptable for Credit: CSU
Lecture 0.75 hour, laboratory 0.75 hour. (0430.00)
This advanced course provides skills in recombinant DNA technology used to analyze and manipulate DNA in the biotechnology laboratory. Students learn about the process of cloning DNA and acquire the skills necessary to cut, piece together, and introduce new DNA molecules into prepared host bacterial cells.

BTEC 206: Principles of Separation and HPLC
Units: 1
Prerequisites: None
Advisory: BTEC 110.
Acceptable for Credit: CSU
Lecture 0.75 hour, laboratory 0.75 hour. (0430.00)
This advanced module provides skills in the separation of biomolecules from complex mixtures using High Performance Liquid Chromatography (HLPC). Instruction will focus on understanding the principles of separation, acquiring skills in the separation of various biomolecules, and analyzing the outcome for the purpose of determining system performance and biomolecular purification. The course assumes prior knowledge of solution preparation, assays, and spectroscopy.

BTEC 207: Techniques in Immunochemistry and ELISA
Units: 1
This laboratory course develops the skills and knowledge related to the culture of cells in increasingly larger scales for the production of biological molecules. Students will grow and monitor a variety of cells (bacterial, yeast, and/or mammalian) on a laboratory scale that emulates the large-scale production used in industry. Students will become familiar with the cleaning, sterilization, aseptic inoculation, operation, and monitoring of fermenters and bioreactors. The course emphasizes the use of current Good Manufacturing Practices (cGMP), process control strategies, and students gain experience following Standard Operating Procedures (SOP).

BTEC 222: Bioprocessing: Large Scale Purification
Units: 1.5
Prerequisites: None
Advisory: BTEC 110; BTEC 120; Eligibility for ENGL 100.
Enrollment Limitation: Not open to students with credit in BTEC 220
Acceptable for Credit: CSU
Lecture 0.75 hour, laboratory 2.25 hours. (0430.00)
This laboratory course develops the skills and knowledge related to purification of biological molecules produced on a large scale. Students will utilize the most common types of separation equipment, including tangential flow filtration, centrifugation, and column chromatography. Students will become familiar with the cleaning, sanitization, calibration, operation, and monitoring of large scale purification equipment. The course emphasizes the use of current Good Manufacturing Practices (cGMP), process control strategies, and students gain experience following Standard Operating Procedures (SOP).

BTEC 230: Techniques in Biofuels Production and Analysis
Units: 1
Prerequisites: None
Advisory: BTEC 110.
Acceptable for Credit: CSU
Lecture 0.75 hour, laboratory 0.75 hour. (0430.00)
This advanced course introduces students to the rapidly developing field of renewable energy and, specifically, biofuels production through a combination of lecture and applied laboratory techniques.

BTEC 292: Internship Studies
Units: 0.5-3
Prerequisites: None
Corequisite: Complete 75 hrs paid or 60 hrs non-paid work per unit.
Enrollment Limitation: Instructor, dept chair, and Career Center approval. May not enroll in any combination of cooperative work experience and/or internship studies concurrently.
Acceptable for Credit: CSU
This course provides students the opportunity to apply the theories and techniques of their discipline in an internship position in a professional setting under the instruction of a faculty-mentor and site supervisor. It introduces students to aspects of the roles and responsibilities of professionals employed in the field of study. Topics include goal-setting, employability skills development, and examination of the world of work as it relates to the student's career plans. Students must develop new learning objectives and/or intern at a new site upon each repetition. Students may not earn more than 16 units in any combination of cooperative work experience (general or occupational) and/or internship studies during community college attendance.

BTEC 296: Topics in Biotechnology
Units: 1-4
Prerequisites: None
Acceptable for Credit: CSU
Lecture 1 hour.
Lecture 2 hours.
Lecture 3 hours.
Lecture 4 hours. (0430.00)

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Prerequisites: None
Advisory: BTEC 110.
Acceptable for Credit: CSU
Lecture 0.75 hour, laboratory 0.75 hour. (0430.00)
This advanced course provides skills in the use of antibody reagents as a tool in the biotechnology laboratory. It focuses on the nature and specificity of antibody reagents for the identification and quantification of biological molecules. Students learn how to set up, perform, and analyze techniques utilizing antibodies, such as Westerns and ELISAs.

This course gives students an opportunity to study topics in Biotechnology that are not included in regular course offerings. Each Topics course is announced, described, and given its own title and 296 number designation in the class schedule.

BTEC 299: Occupational Cooperative Work Experience
Units: 1-6
Prerequisites: None
Corequisite: Complete 75 hrs paid or 60 hrs non-paid work per unit.
Enrollment Limitation: Career Center approval. May not enroll in any combination of cooperative work experience and/or internship studies concurrently.
Acceptable for Credit: CSU
Cooperative Work Experience is intended for students who are employed in a job directly related to their major. It allows such students the opportunity to apply the theories and skills of their discipline to their position and to undertake new responsibilities and learn new skills at work. Topics include goal-setting, employability skills development, and examination of the world of work as it relates to the student's career plans. Students may not earn more than 16 units in any combination of cooperative work experience (general or occupational) and/or internship studies during community college attendance.

Mt San Jacinto College

Biotechnology

Course Descriptions from 2013-2014 Catalog

BIOL 131 4 units
Introduction to Biotechnology I LEC 48-54/LAB 48-54
This introductory course examines a variety of topics in biology related to Biotechnology. Topics emphasized include the biochemical processes common in prokaryotic and eukaryotic biology, biochemistry, cellular and molecular biology, immunology, classical and molecular genetics, gene expression and genetic engineering. The laboratory addresses skills and techniques common to biotechnology including measuring activity and quantity of proteins, growth and manipulation of bacteria, genetic engineering and antibody methods. Field trips may be required. Prerequisite: None.

BIOL 132 5 units
Biotechnology II LEC 48-54/LAB 96-108
This course introduces students to biochemical and microbial academic aspects of biotechnology. The course develops entry-level laboratory skills common to the biotechnology industry, such as aseptic techniques, laboratory safety, and biological media and solution preparation. Students also develop hands-on experience with microbial growth, solutions, buffers, separation of cellular components, and macromolecules. Prerequisite: BIOL-131 or BIOL-150 (with a grade of C or better).

BIOL 133 5 units
Biotechnology III LEC 48-54/LAB 96-108
In this advanced biotechnology course, students are provided a depth and breadth of knowledge of DNA and RNA transformation, restriction analysis of DNA, protein analysis, and immunological applications. Medical application and bioethical considerations are discussed. In the laboratory, students master current techniques used in the biotechnology industry including medical and criminal justice applications. Prerequisite: BIOL-132 (with a grade of C or better).

BIOL 139 1 unit
Introduction to Biotechnology Lab LAB 48-54
This course examines laboratory technology related to biotechnology. The laboratory introduces skills and techniques common to the biotechnology industry including measuring activity and quantity of proteins, growth and manipulation of bacteria, genetic engineering, polymerase chain reaction and antibody methods. In addition to hands on skills, the course provides context for how and why these techniques are used in the industry. This course enhances the laboratory skills of students seeking employment in the biotechnology industry. Prerequisite: None.

SD City College

Biotechnology

Awards & Certificates

Associate in Science Degree:
Transfer Track 23-24*
Allied Health Track 21*
Applied Biology Track 29*
*and courses to meet graduation requirements, general education and electives as needed to meet minimum of 60 units required for the degree.

Certificate of Performance
Applied Biotechnology
Students may take the specific biotechnology courses (Biology 206) and receive a Certificate of Completion authorized and issued by the academic department. It is not intended to nor will it be recognized as an official state approved program. It is intended to provide students with intensive

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laboratory skills development experience to meet entry-level employment requirements in the biotechnology industry.
Courses required for the Certificate Units
BIOL 109 Introduction to Applied Biology 5
BIOL 206 Biotechnology Instrumentation 6
Total Units = 11
*A Certificate of Performance is a departmental award that does not appear on the student's transcript. All courses must be completed within the San Diego Community College District.

Course Descriptions from 2013-2014 Catalog

91 Employment Skills In Biotechnology (AKA BIOL 265C)
3 hours lecture, 3 hours lab, 4 units
Letter Grade or Pass/No Pass Option
Advisory: English 48 and English 49 or English 47, each with a grade of "C" or better, or equivalent or Assessment Skill Levels R5 and W5; Mathematics 46 with a grade of "C" or better, or equivalent or Assessment Skill Level M40.
Limitation on Enrollment: This course is not open to students with previous credit for Biology 265C.
This course integrates conceptual and technical biotechnology skills with interpersonal and communication skills essential for entry level employment in biotechnology. Emphasis is placed on literature and employment database searching, use of data analysis software, resume writing, interview techniques, seminar presentations, team building, independent learning, time management, collaboration, hands on experience in the field, and service learning. This course requires field trips to area biotechnology companies and research

206 Biotechnology Instrumentation
3 hours lecture, 9 hours lab, 6 units Grade Only
Prerequisite: Biology 109 with a grade of "C" or better, or equivalent
This is an advanced lecture/laboratory course implementing major techniques used in the biotechnology industry. Topics include tissue culture methods, purification and analysis of nucleic acids and proteins, DNA amplification and cloning procedures, protein identification methods, scientific information retrieval, and technical writing. This course is tended for students seeking employment opportunities in biotechnology information retrieval, and technical writing. This course is intended for students seeking employment (FT) AA/AS; CSU.

109 Introduction to Applied Biology (AKA Preparation for Biotechnology)
3 hours lecture, 6 hours lab, 5 units Grade Only
Advisory: English 48 and English 49 and Mathematics 46 each with a grade of "C" or better, or equivalent, or Assessment Skill Levels R5 and W5 and M40.
Limitation on Enrollment: This course is not open to students with previous credit for Biology 265B.
This course is intended as a preparation course for students interested in further studies in biotechnology. The course provide the fundamental knowledge in mathematics, chemistry, biology and microbiology for additional biotechnology coursework. Topics include the funcamental chemical processes common in prokaryotic and eukaryotic biology, chemistry of biomolecules, cellular and molecular biology, gene expression and genetic engineering. The laboratory experience provides basic skills and techniques essential to advanced biotechnology courses.
(FT) AA/AS; CSU. * May be Grant Funded

SD Miramar

Biotechnology (For Medical Laboratory Technician Information - Click Here)

Awards & Certificates

Certificate of Performance:
Applied Biotechnology-Analytical Chemistry 9
Applied Biotechnology-Molecular Biology 8

Associate in Science Degree:
Allied Health Track 21*
Applied Biology Track 35*
Biology Studies 18*
* and electives as needed to meet minimum of 60 units required for the degree.
Description
Biology is a natural science that focuses on physical and chemical processes of living organisms. This discipline explores how organisms acquire and use energy to maintain homeostasis, how they reproduce, and how they interact with each other and their environment. Scientific processes are emphasized as a means of answering these biological questions. Biologists rely heavily on a chemistry foundation since living organisms are

Certificate of Performance:
Applied Biotechnology-Analytical Chemistry*
Students may take the specific biotechnology courses and receive a Certificate of Performance authorized and issued by the academic department. It is not intended to nor will it be recognized as an official state approved program. It is intended to provide students with intensive laboratory skills development experience to meet entry-level employment requirements in the biotechnology industry.
Courses: Units
BIOL 132 Applied Biotechnology I 4
CHEM 251 Quantitative Analytical Chemistry 5
Total Units = 9
*A Certificate of Performance is a departmental award that does not appear on the student's transcript. All courses must be completed within the San Diego Community College District.

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chemical systems.
Program Learning Outcomes
The biology program serves four areas of study. First, it provides a broad background of studies for the biology major preparing for transfer to a four-year institution. Second, the Applied Biology Associate Degree curriculum provides preparation for entry level employment as a technician in the life sciences industry. In addition to the associate degree programs, certificates in Applied Biotechnology with emphasis in either Molecular Biology or Analytical Chemistry are offered. The biology program also offers support courses in human anatomy, human physiology and general microbiology which may be used to satisfy prerequisites for nursing programs and other allied health fields. Fourth, the biology program provides courses in natural science to fulfill general education requirements.

Course Descriptions from 2013-2014 Catalog

131 Introduction to Biotechnology
3 hours lecture, 3 hours lab, 4 units
Grade Only
Advisory: English 49 with a grade of "C" or better, or equivalent or Assessment Skill Level W5.
This course is a general examination of biology as it relates to the field of biotechnology. Topics include the fundamental chemical processes common in prokaryotic and eukaryotic biology, chemistry of bio-molecules (proteins, enzymes, nucleic acids and lipids), cellular and molecular biology, basic immunology, and classical and molecular genetics with an emphasis on gene expression and genetic engineering. The laboratory addresses basic skills and techniques common to the biotechnology industry. Topics include the measurement of activity and quantity of proteins, growth and manipulation of bacteria, genetic engineering and antibody methods. This course is intended for students majoring in applied biology and as a general education option for all students. (FT) AA/AS; CSU; UC.

132 Applied Biotechnology I
2 hours lecture, 6 hours lab, 4 units
Letter Grade or Pass/No Pass Option
Advisory: English 49 with a grade of "C" or better, or equivalent, or Assessment Skill Level W5; and Chemistry 152 and 152L; or Chemistry 100 and 100L, each with a grade of "C" or better, or equivalent.
Students learn entry-level skills common to the biotechnology industry, such as aseptic techniques, laboratory safety, and biological media and solution preparation. Students also learn about microbial growth, solutions, buffers, separation of cellular components, and macromolecules. (FT) AA/AS; CSU.
133 Applied Biotechnology II
2 hours lecture, 6 hours lab, 4 units
Letter Grade or Pass/No Pass Option
Advisory: Biology 132 or Biology 210A and Chemistry 100 and 100L, each with a grade of "C" or better, or equivalent.
In this advanced biotechnology training course, students learn about transformation, restriction analysis of DNA, protein analysis, and immunological applications. In the lab, students practice mastering current techniques used in the biotechnology industry. (FT) AA/AS; CSU.

Certificate of Performance:
Applied Biotechnology-Molecular Biology*
Students may take the specific biotechnology courses and receive a Certificate of Performance authorized and issued by the academic department. It is not intended to nor will it be recognized as an official state approved program. It is intended to provide students with intensive laboratory skills development experience to meet entry-level employment requirements in the biotechnology industry.
Courses: Units
BIOL 132 Applied Biotechnology I 4
BIOL 133 Applied Biotechnology II 4
Total Units = 8

133 Applied Biotechnology II
2 hours lecture, 6 hours lab, 4 units
Letter Grade or Pass/No Pass Option
Advisory: Biology 132 or Biology 210A and Chemistry 100 and 100L, each with a grade of "C" or better, or equivalent.
In this advanced biotechnology training course, students learn about transformation, restriction analysis of DNA, protein analysis, and immunological applications. In the lab, students practice mastering current techniques used in the biotechnology industry. (FT) AA/AS; CSU.

134 Introduction to the Biotechnology Lab
3-4 hours lab, 1 unit
Letter Grade or Pass/No Pass Option
Advisory: English 48 and English 49, each with a grade of "C" or better, or equivalent, or Assessment Skill Levels R5 and W5.
Limitation on Enrollment: This course is not open to students with previous credit for Biology 131 Introduction to Biotechnology.
This course examines biology laboratory technology as it relates to the field of Biotechnology. The laboratory addresses basic skills and techniques common to the biotechnology industry including measuring activity and quantity of proteins, growth and manipulation of bacteria, genetic engineering, polymerase chain reaction and antibody methods. In addition to hands on skills, the course will provide context for how and why these techniques are used in the industry. This course enhances the laboratory skills of students wishing to be employed by the biotechnology industry. It is intended as an elective and for students in Applied Biology (Biotechnology) and Allied Health Tracks. (FT) AA/AS; CSU.

SD Miramar

Medical Laboratory Technology Continued Below

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Awards & Certificates

San Diego Miramar College Medical Lab Tech Program

Certificate of Performance:
Medical Laboratory Technician Training 12-13
Certificate of Achievement:
Medical Laboratory Technology 20
Associate in Science Degree:
Medical Laboratory Technology 20*
* and electives as needed to meet minimum of 60 units required for the degree.

The Medical Laboratory Technology (MLT) program prepares students for employment in clinical laboratories, industry and biotechnology. The program curriculum integrates basic concepts, technical procedures, and laboratory exercises. This provides practical experience for students to master the competencies, skills, and knowledge required in this profession.
The MLT program is designed to produce trained employees to enter the laboratory workforce. As such, the program's primary learning outcome is to graduate competent, workplace-ready members of the laboratory team who
• Exhibit theoretical comprehension and competence in all didactic MLT courses by passing comprehensive college and certification exams.
• Demonstrate entry-level MLT skills in the following clinical laboratory areas: Clinical Chemistry, Hematology, Urinalysis and Coagulation, Immunology and Immunohematology, and Microbiology.
• Demonstrate professionalism and awareness of their role in the delivery of health care to patients, such as respecting the rights of patients, colleagues and other health professionals as they perform duties within the constraints of legal, moral and ethical conduct.
• Exhibit positive attitudes in the areas of professionalism and commitment to delivering excellent health care.
The MLT program is designed to educate and prepare students to sit for a national exam, which when passed will allow for immediate entry into a clinical lab environment as a Medical Laboratory Technician. The types of clinical labs include community-based hospital labs, teaching hospitals, private hospitals and clinics, and clinical research organization (CRO) support services. The Certificate of Performance option is best for those seeking work in an unlicensed capacity.

Associate in Science: Total Units = 20
Medical Laboratory Technology
Courses Required for the Major: Units
MLTT 201 Clinical Chemistry and Urinalysis 4
MLTT 202 Clinical Hematology and Immunology 4
MLTT 203 Clinical Microbiology 4
MLTT 051 Directed Clinical Practice in Clinical Chemistry 2
MLTT 052 Directed Clinical Practice in Clinical Hematology, Urinalysis and Coagulation 2
MLTT 053 Directed Clinical Practice in Clinical Immunology and Immunohematology 2
MLTT 054 Directed Clinical Practice in Clinical Microbiology 2

Certificate of Performance:
Medical Laboratory Technician Training*
The Certificate of Performance in Medical Laboratory Technician Training is designed to enhance or develop the skill sets of the medical laboratory technician or those seeking employment in the field of medical laboratory technology. The Certificate of Performance option is recommended for those seeking employment in an unlicensed capacity, for example in the biotechnology industry.
This is a department award in recognition of information on the transcript and does not imply that a graduation requirement has been met. Students must complete a series of biology and chemistry prerequisites prior to enrolling in the courses required for this certificate. Please consult the course description section of the catalog and a Miramar College counselor for more information.
Courses: Units
MLTT 201 Clinical Chemistry and Urinalysis 4
MLTT 202 Clinical Hematology and Immunology 4
MLTT 203 Clinical Microbiology 4
or
BIOL 205 General Microbiology 5
Total Units = 12-13
*A Certificate of Performance is a departmental award that does not appear on the student's transcript. All courses must be completed within the San Diego Community College District.

Certificate of Achievement:
Medical Laboratory Technology
Courses Required for the Major: Units
MLTT 201 Clinical Chemistry and Urinalysis 4
MLTT 202 Clinical Hematology and Immunology 4
MLTT 203 Clinical Microbiology 4
MLTT 051 Directed Clinical Practice in Clinical Chemistry 2
MLTT 052 Directed Clinical Practice in Clinical Hematology, Urinalysis and Coagulation 2
MLTT 053 Directed Clinical Practice in Clinical Immunology and Immunohematology 2
MLTT 054 Directed Clinical Practice in Clinical Microbiology 2
Total Units = 20
Note: The student will be required to complete a series of biology and chemistry prerequisites for the MLT program. Please consult the catalog and counselors for more information.

Course Descriptions from 2013-2014 Catalog

51 Directed Clinical Practice in Clinical

201 Clinical Chemistry and Urinalysis

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Chemistry
160 hours other, 2 units
Grade Only
Prerequisite: Medical Laboratory Technician Training 201, 202 and 203, each with a grade of “C” or better, or equivalent completed within five years prior to enrollment.
Limitation on Enrollment: Health and Safety; Certified Phlebotomy Technician Level I (CPT-1 License CA). Must obtain an Add Code from the instructor for enrollment. Required to verify CPT-1 License and clinical placement.
This course provides clinical laboratory practice and experience in the laboratory of general and specialized chemistry. Various instrumentation, as well as bench and manual methods, will be introduced. Emphasis is placed on technique, accuracy and precision. This practicum will take place at a clinical affiliate site that will be assigned by the Medical Laboratory Technician Training Program Director. This course is intended for students majoring in Medical Laboratory Technology. (FT) AA/AS.

52 Directed Clinical Practice in Clinical Hematology, Urinalysis and Coagulation
160 hours other, 2 units
Grade Only
Prerequisite: Medical Laboratory Technician Training 201, 202 and 203, each with a grade of “C” or better, or equivalent completed within five years prior to enrollment.
Limitation on Enrollment: Health and Safety; Certified Phlebotomy Technician Level I (CPT-1 License CA). Must obtain an Add Code from the instructor for enrollment. Required to verify CPT-1 License and clinical placement.
This course provides laboratory practice and experience in the laboratory of hematology, urinalysis and coagulation. Various instrumentation, as well as bench and manual methods, will be introduced. Emphasis is placed on technique, accuracy and precision. This practicum will take place at a clinical affiliate site that will be assigned by the Medical Laboratory Technician Training Program Director. This course is intended for students

majoring in Medical Laboratory Technology. (FT) AA/AS.

53 Directed Clinical Practice in Clinical Immunology and Immunohematology
160 hours other, 2 units
Grade Only
Prerequisite: Medical Laboratory Technician Training 201, 202 and 203, each with a grade of “C” or better, or equivalent completed within five years prior to enrollment.
Limitation on Enrollment: Health and Safety; Certified Phlebotomy Technician Level I (CPT-1 License CA). Must obtain an Add Code from the instructor for enrollment. Required to verify CPT-1 License and clinical placement.
This course provides clinical laboratory practice and experience in the laboratory of serology and blood banking, including syphilis serology and general immunology. Various instrumentation, as well as bench and manual methods, will be introduced. Emphasis is placed on technique, accuracy and precision. This practicum will take place at a clinical affiliate site that will be assigned by the Medical Laboratory Technician Training Program Director.

1 hour lecture, 9 hours lab, 4 units
Grade Only
Prerequisite: Biology 107 or Biology 131 with a grade of “C” or better, or equivalent and Chemistry 130, 130L, Biology 230 and 235, each with a grade of “C” or better, or equivalent completed within seven years prior to enrollment.
Advisory: English 101 and Mathematics 96, each with a grade of “C” or better, or equivalent or Assessment Skill Levels R6, W6 and M50.
Limitation on Enrollment: Must obtain an Add Code from the instructor for enrollment. Required to verify recency of prerequisite coursework.
This course introduces the theory and practice underlying the basic methodologies used in clinical chemistry and urinalysis. Lecture covers an introduction to components of body fluids such as blood and urine, basic principles of the clinical laboratory, quality control and quality assurance, patient confidentiality and safe handling practices of body fluids. Laboratory covers principles and theories of clinical chemistry with an emphasis on methodologies and instrumentation common to the clinical chemistry and urinalysis laboratory, specimen handling, measurement, and data analysis. This course is intended for students majoring in Medical Laboratory Technology or those wanting to update their medical laboratory skill set. (FT) AA/AS; CSU.

202 Clinical Hematology and Immunology
32 - 36 hours lecture, 96 - 108 hours lab, 4 units
Grade Only
Prerequisite: Biology 107 or 131 with a grade of “C” or better, or equivalent and Chemistry 130, 130L, Biology 230 and 235, each with a grade of “C” or better, or equivalent completed within seven years prior to enrollment.
Advisory: English 101 and Mathematics 96, each with a grade of “C” or better, or equivalent or Assessment Skill Levels R6, W6 and M50.
Limitation on Enrollment: Must obtain an Add Code from the instructor for enrollment. Required to verify recency of prerequisite coursework.
This course introduces the theory and practice underlying the basic methodologies used in clinical hematology, immunology and blood banking. Lecture covers an introduction to components of
AA/AS = Associate Degree Applicable
CSU = California State University Applicable
UC = University of California Applicable

203 Clinical Microbiology
2 hours lecture, 6 hours lab, 4 units
Grade Only
Prerequisite: Biology 107 or 131 with a grade of “C” or better, or equivalent and Chemistry 130, 130L, Biology 230 and 235, each with a grade of “C” or better, or equivalent completed within seven years prior to enrollment.
Advisory: English 101 and Mathematics 96, each with a grade of “C” or better, or equivalent or Assessment Skill Levels R6, W6 and M50.
Limitation on Enrollment: Must obtain an Add Code from the instructor for enrollment. Required to verify recency of prerequisite coursework.
This course introduces the theory and methods used in clinical microbiology laboratory. Lecture covers an introduction to the dynamics of infectious disease including clinical, epidemiologic, and therapeutic features of clinically relevant organisms. Laboratory covers principles and techniques commonly used in the identification of clinically relevant microorganisms. This course is intended for students

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This course is intended for students majoring in Medical Laboratory Technology. (FT) AA/AS.

54 Directed Clinical Practice in Clinical Microbiology
160 hours other, 2 units
Grade Only
Prerequisite: Medical Laboratory Technician Training 201, 202 and 203, each with a grade of "C" or better, or equivalent completed within five years prior to enrollment.
Limitation on Enrollment: Health and Safety; Certified Phlebotomy Technician Level I (CPT-1 License CA). Must obtain an Add Code from the instructor for enrollment. Required to verify CPT-1 License and clinical placement.
This course provides laboratory practice and experience in the clinical laboratory of microbiology. Various instrumentation, as well as bench and manual methods, will be introduced. Emphasizes technique, accuracy and precision. This practicum will take place at a clinical affiliate site that will be assigned by the Medical Laboratory Technician Training Program Director. This course is intended for students majoring in Medical Laboratory Technology. (FT) AA/AS.

majoring in Medical Laboratory Technology or those wanting to update their medical laboratory skill set. (FT) AA/AS; CSU

Southwestern College

Program Descriptions

(For Medical Laboratory Technician Information - Click Here)

Associate in Science Degree
Biotechnology
Transfer Preparation * (Major Code: 01512)

The associate in science degree augments student transfer preparation and qualifies students for entry-level positions in biotechnology research laboratories.
First Semester: MATH 70 Intermediate Algebra II 4
Second Semester: BIOL 100 Principles of Biology ** 3
BIOL 101 Principles of Biology Laboratory ** 1
BIOL 205 DNA Science I 2
BIOL 229 Introduction to Biological Research I 3
CHEM 170 Preparation for General Chemistry (4) ** OR
CHEM 200 General Chemistry I (5) **
Third Semester: BIOL 206 DNA Science II 2
BIOL 211 Introduction to Cell and Molecular Biology 4
BIOL 230 Introduction to Biological Research II 3
BIOL 265 General Microbiology 5
Total units 31–32
** Transfer students should substitute higher-level courses required for their major (e.g.: BIOL 210 can replace BIOL 100/101; CHEM 170 or 200 can be replaced by higher-numbered chemistry courses; and MATH 70 can be replaced by higher-numbered math courses.
To earn an associate degree, additional general education and graduation requirements must be completed. See page 49.

Biotechnology
Certificate of Achievement
Career/Technical (Major Code: 01511)
Provides training in the theory and practices of biotechnology, which include introduction to microbiology, cell biology, and molecular biology techniques. Each participant is required to take a qualifying examination prior to certification.
First Semester: MATH 70 Intermediate Algebra II * 4
Second Semester: BIOL 100 Principles of Biology * 3
BIOL 101 Principles of Biology Laboratory * 1
BIOL 205 DNA Science I 2
BIOL 229 Introduction to Biological Research I 3
CHEM 170 Preparation for General Chemistry (4) OR
CHEM 200 General Chemistry I (5)
Third Semester: BIOL 206 DNA Science II 2
BIOL 211 Introduction to Cell and Molecular Biology 4
BIOL 230 Introduction to Biological Research II 3
BIOL 265 General Microbiology 5
Total units 31–32

* Higher-numbered courses are also acceptable: BIOL 210 can replace BIOL 100/101; CHEM 170 or 200 can be replaced by higher-numbered chemistry courses; and MATH 70 can be replaced by higher-numbered math courses.

Course Descriptions from 2013-2014 Catalog

BIOL 205.
DNA Science I
2 units Grade Only
Recommended Preparation: ENGL 115 or equivalent; RDG 158 or the equivalent skill level as determined by the Southwestern College
Reading Assessment or equivalent Lecture 2 hours
Offered: Fall
Provides theoretical background useful in the biotechnology job market or for a bachelor's degree
in biology. [D; CSU]

BIOL 229.
Introduction to Biological Research I
3 units Grade Only
Prerequisite: MATH 70 or the equivalent skill level as determined by the Southwestern College
Mathematics Assessment or equivalent
Recommended Preparation: CHEM 100 or equivalent;
ENGL 115 or equivalent; RDG 158 or the equivalent skill level as determined by the Southwestern
College Reading Assessment or equivalent
Recommended Concurrent Enrollment: CHEM 170

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BIOL 206.

DNA Science II

2 units Grade Only

Prerequisite: BIOL 205 or equivalent
Recommended Preparation: ENGL 115 or equivalent; RDG 158 or the equivalent skill level as
determined by the Southwestern College Reading Assessment or equivalent
Recommended Concurrent
Enrollment: BIOL 211 Lecture 2 hours
Offered: Spring
Provides theoretical background useful in the biotechnology job market or for a bachelor's degree in biology. [D; CSU]i

Lecture 2 hours, laboratory 3 hours Offered: Fall
Introduces biological laboratory skills, safety procedures, disposal of laboratory waste materials;
experimental design and data analysis; preparation of laboratory reagents; aseptic technique,
chromatography, and electrophoresis; maintenance of laboratory records, library research, resume

writing; and management of a research laboratory.

[D; CSU]

BIOL 230.
Introduction to Biological Research II
3 units Grade Only
Prerequisite: BIOL 229 or equivalent; CHEM 170 or equivalent; MATH 70 or the equivalent skill level as determined by the Southwestern College
Mathematics Assessment or equivalent
Recommended Preparation: ENGL 115 or equivalent;
RDG 158 or the equivalent skill level as determined by the Southwestern College Reading Assessment or equivalent. Lecture 2 hours; Laboratory 3
hours. Offered: Spring
Emphasizes current concepts and laboratory training in modern molecular biological techniques.

Designed for biology majors and students interested in working in a molecular biology and/or biotechnology industry, biology and/or biotechnology laboratory [D; CSU]

Southwestern College

Medical Laboratory Technology

Awards & Certificates
Associate in Science Degree
Medical Laboratory Technician
Career/Technical (Major Code: 02385)
How to Apply

Applicants must be eligible for admission to the College. In addition to the College application, a special application for the program is required. Program information and application forms are available on the College web site at www. swccd.edu, or in the medical laboratory technician department office at the Higher Education Center—National City. Applications will be accepted after prerequisite courses and other requirements are met. Students accepted into the medical laboratory technician program are subject to further screening to determine eligibility to be admitted into the program. **Special Instructions:** Students enrolled in the medical laboratory technician program are required to provide their own transportation to off-campus clinical agencies. A fee for malpractice insurance is charged for each year of the program, as well as a minimal fee for supplies. Students are also responsible for purchasing certain equipment such as a laboratory coat. CPR certification: students are required to be certified by the American Heart Association (AHA) certification, prior to admission and to maintain certification throughout the program. Phlebotomy skills: students must be California certified phlebotomists. A grade of "C" or better is required in all medical laboratory technician courses for progression and satisfactory completion. Progress in the medical laboratory technician program is dependent upon completion of medical laboratory technician courses in the prescribed sequence as outlined for the program.

* College-level reading ability as evidenced by a satisfactory result on the Southwestern College Reading Assessment process, earning a "C" or better in RDG 158, ENGL 115, or equivalent reading course; equivalency documented by approved petition; or college transcript showing an earned associate or bachelor's degree from a U.S. accredited institution. * Math proficiency as evidenced by eligibility for Math 60 or higher as demonstrated on the college math assessment process, earning a "C" or better in Math 45 or higher-numbered math course, or equivalent as documented by an approved petition. Before a space in the medical laboratory technician program can be offered, applicants must verify completion of the series of vaccinations for Hepatitis B or immunity to Hepatitis B or sign a form declining to be vaccinated. Students who have been accepted into the program must meet the following conditions: attend a scheduled class orientation, submit a completed physical examination form with evidence of required immunizations, tuberculosis screening, CPR certification, and provide evidence of payment of malpractice insurance premium. Accepted students are required to complete an online background check and drug screening prior to enrollment into the program. The background check and drug screening are mandated by the policies of the hospitals/clinical sites for all health occupation programs faculty and students. **(Continued Below)**

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Students will not be permitted to progress to the next semester until previous semester medical laboratory technician courses are completed.A grade of “C” or better is required in all medical laboratory technician courses for progression and satisfactory completion. Progress in the medical laboratory technician program is dependent upon completion of medical laboratory technician courses in the prescribed sequence as outlined for the program. Students will not be permitted to progress to the next semester until previous semester medical laboratory technician courses are completed. Medical Laboratory Technology—Associate in Science Degree In order to apply and be placed on the priority list for the medical laboratory technician program, applicants must document the following: * Basic science prerequisites (BIOL 260, 261, 265 and CHEM 100, 110) must be completed with a cumulative GPA of 2.7 or higher. Foreign transcripts not submitted at time of application may not be used to meet program or graduation requirements. Required science courses taken at Southwestern College have prerequisites including college-level biology, chemistry, and algebra courses or credit for the appropriate college-level examination (CLEP) * Graduation from a U.S. high school or satisfactory score on the GED or evidence of other high school equivalency certificate or a degree from a U.S. accredited institution.

Anyone with background check issues (includes misdemeanors and felony’s) may not be eligible for the program. Many of the hospital systems are now refusing to take students with any background check issues. Each student situation will be evaluated as they complete the background check. The student must provide a urine sample for drug testing per hospital request. A medical laboratory technician performs routine clinical laboratory testing procedures to provide scientific information needed in diagnosis, prognosis and treatment of disease. Technicians use sophisticated instrumentation for these evaluations which encompass quantitative and qualitative chemical and biological analyses of body specimens. Technicians function under the supervision of a qualified practitioner. The program prepares students for a career in Medical Laboratory Technology through the studies in humanities, social and natural sciences, and the field of Medical Laboratory Technology. Emphasis is placed on the clinical practice in the context of laboratory medicine. Graduates are eligible to take and pass a nationally recognized certification examination.

Prerequisites
BIOL 260 Human Anatomy 5
CHEM 100 Introduction to General Chemistry 4
CHEM 110 Elementary Organic and Biological Chemistry 4
ENGL 115 Reading and Composition: Exposition and 4
Argumentation
COMM 103 Interpersonal Communication
OR 3
COMM 174 Interpersonal Communication
BIOL 261 Principles of Human Physiology 4
BIOL 265 General Microbiology 5
MATH 60 Intermediate Algebra I 4

Course Descriptions from 2013-2014 Catalog

MLT 80.
Introduction to the Clinical Laboratory Profession
1 unit
Grade only
Corequisite: MLT 90, 100, 101, and 110
Limitation on Enrollment: Enrollment is limited to those students in the Medical Laboratory Technical program
Lecture 1 hour
Offered: Fall
Introduces functions and duties of a Medical Laboratory Technician (MLT), and compares and contrasts these duties to the Clinical Laboratory Scientist (CLS). Emphasizes the clinical laboratory safety issues, regulatory agencies, infection control policies, and professional responsibilities relative to other departments of healthcare. [D]

MLT 90.
Clinical Urinalysis and Body Fluids
1 unit
Grade only
Corequisite: MLT 80, 90L, 100, 101, and 110
Lecture 1 hour
Offered: Fall
Introduces various properties and constituents of urine and body fluids via “on hands” learning. Emphasizes interpretation and handling of urine and body fluid specimens. Includes examination of urine and body fluids physically, chemically and microscopically, and compares these clinical values to health and disease. [D]

MLT 90L.
Clinical Urinalysis and Body Fluids Laboratory
.5 unit
Grade only
Corequisite: MLT 90
Laboratory 1.5 hours
Offered: Fall

MLT 111.
Clinical Chemistry II
3 units
Grade only
Prerequisite: MLT 110 and 110L, or equivalent
Corequisite: MLT 102 and 111L

Lecture 3 hours
Offered: Spring
Introduces the relationships between the endocrine system and analytes assayed in the clinical laboratory including tumor markers, therapeutic drugs, and toxicology. Emphasizes liver, kidney, pancreatic function and vitamins assayed with test results, and comparison with states of health and disease. Includes function and laboratory analysis of various body fluids. [D; CSU]

MLT 111L.
Clinical Chemistry II Laboratory
1 unit
Grade only
Corequisite: MLT 111
Laboratory 3 hours
Offered: Spring
Introduces the endocrine system, therapeutic drug assays and compounds, and other clinical chemistry tests specific to special chemistry department. Emphasizes the automated instrumentation which will include quality control review, maintenance, and clinical operation. [D; CSU]

MLT 112.
Clinical Chemistry Practicum
4 units
Grade only
Prerequisite: MLT 111 and 111L, or equivalent
Corequisite: MLT 130
Lecture 4 hours Offered: Summer

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Introduces various techniques and safety procedures in clinical urinalysis. Emphasizes examination of urine and body fluids. [D]

MLT 100.
Clinical Hematology
3 units
Grade only
Corequisite: MLT 80, 90, 100L, 101, and 110
Recommended Preparation: RDG 158 or the equivalent skill level as determined by the Southwestern College Reading Assessment or equivalent
Lecture 3 hours
Offered: Fall
Introduces the origin of the various types of blood cells with emphasis on the red and white blood cells. Includes human hematological disorders and classification based on clinical laboratory findings. [D; CSU]

MLT100L.
Clinical Hematology Laboratory
1 unit
Grade only
Corequisite: MLT 100
Recommended Preparation: RDG 158 or the equivalent skill level as determined by the Southwestern College Reading Assessment or equivalent

Laboratory 3 hours
Offered: Fall
Introduces various techniques and safety procedures used in the clinical hematology laboratory. Emphasizes morphology and the identification of common human blood cells. [D; CSU]

MLT 101.
Clinical Coagulation
1 unit
Grade only
Corequisite: MLT 80, 90, 100, 101L, and 110
Recommended Preparation: RDG 158 or the equivalent skill level as determined by the Southwestern College Reading Assessment or equivalent

Lecture 1 hour
Offered: Fall
Provides an overview of the homeostatic process, diseases, and laboratory evaluations. [D; CSU]

MLT 101L.
Clinical Coagulation Laboratory
.5 unit
Grade only
Corequisite: MLT 101
Recommended Preparation: RDG 158 or the equivalent skill level as determined by the Southwestern College Reading Assessment or equivalent
Laboratory 1.5 hours
Offered: Fall
Introduces the various techniques and safety procedures used in the clinical coagulation laboratory. Emphasizes platelet function tests, and intrinsic and extrinsic clotting pathway testing. [D; CSU]

MLT 102.
Clinical Hematology, Coagulation, Urinalysis and Body Fluids Practicum
5 units
Grade only
Prerequisite: MLT 90, 90L, 100, 100L, 101, and 101L , or equivalent Corequisite: MLT 111 and 120
Lecture 5 hours
Offered: Spring

Introduces entry-level clinical laboratory practice and experience in the department of general and special chemistry. Emphasizes technique, accuracy, and precision. Includes instrumentation bench and manual methods. [D; CSU]

MLT 120.
Clinical Microbiology
3 units
Grade only
Prerequisite: MLT 90 and 90L, or equivalent
Corequisite: MLT 120L

Lecture 3 hours
Offered: Spring
Introduces micro-organisms of medical microbiology with emphasis on the characteristics of clinically significant micro-organisms and their biochemical profile, media for isolation, and identification methods for selected pathogens. Emphasizes identification methods, theories, and techniques used in basic bacteriology, parasitology, virology, and mycology. [D; CSU]

MLT 120L.
Clinical Microbiology Laboratory
1 unit
Grade only
Corequisite: MLT 120
Recommended Preparation: RDG 158 or the equivalent skill level as determined by the Southwestern College Reading Assessment or equivalent

Laboratory 3 hours
Offered: Spring
Introduces various techniques and safety procedures in clinical microbiology. Emphasizes morphology and identification of common pathogenic organisms. [D; CSU]

MLT 121.
Clinical Microbiology Practicum
5 units
Grade only
Prerequisite: MLT 120 and 120L ,or equivalent
Recommended Preparation: RDG 158 or the equivalent skill level as determined by the Southwestern College Reading Assessment or equivalent

Lecture 5 hours
Offered: Fall
Introduces clinical laboratory practice and experience in the department of microbiology. Emphasizes technique, accuracy, and precision. Includes instrumentation as well as bench and manual methods. [D; CSU]

MLT 130.
Clinical Immunology and Immunohematology
3 units
Grade only
Prerequisite: MLT 100 and100L, or equivalent
Corequisite: MLT 130L

Lecture 3 hours
Offered: Summer
Introduces basic principles of antigen and antibody reactions included in blood grouping and typing, compatibility testing and serological procedures. [D; CSU]

MLT 130L.
Clinical Immunology and Immunohematology Laboratory
1 unit
Grade only
Corequisite: MLT 130

Laboratory 3 hours
Offered: Spring

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Introduces entry-level clinical laboratory practice and experience in the department of hematology, urinalysis, coagulation, and body fluids. Emphasizes technique, accuracy, and precision. [D; CSU]

MLT 110.
Clinical Chemistry I
3 units
Grade only
Corequisite: MLT 80, 90, 100, 101, and 110L
Lecture 3 hours
Offered: Fall
Provides theoretical, fundamental, basic instrumentation methodologies, and includes practical concepts associated with testing procedures used in the clinical chemistry laboratory. Includes important characteristics and relevance of electrolytes and trace metals including their relationship to acid base balance. [D; CSU]

MLT 110L.
Clinical Chemistry I Laboratory
1 unit
Grade only
Corequisite: MLT 110

Laboratory 3 hours
Offered: Fall
Introduces general laboratory principles and specific basic instrumentation methodologies used in clinical chemistry analysis. Reviews laboratory math and a reintroduction to quality control and quality assurance. Emphasizes variables of the preanalytical phase, characteristics important to quality lab technique, and safety. [D; CSU]

Introduces the various techniques and safety procedures used in the clinical serology and blood bank laboratories. Emphasizes serological and immunohematology procedures, and techniques to measure analytes qualitatively and quantitatively. [D; CSU]

MLT 131.
Clinical Immunology and Immunohematology Practicum
4 units
Grade only
Prerequisite: MLT 130 and 130L, or equivalent
Lecture 4 hours
Offered: Fall
Introduces clinical laboratory practice and experience in the department of serology and blood banking. Emphasizes technique, accuracy, and precision. Includes the introduction of different instrumentation as well as bench and manual methods. [D; CSU]

MLT 295.
Selected Topics in Medical Laboratory Technology
1–3 units
Offered: Variable
Permits students to study relevant subjects within the field of medical laboratory technology. The specific objectives, methods of instruction and units of credit to be determined individually for projects proposed under this course description. [D; CSU]

MLT 299.
Independent Study 1–3 units Offered: Variable Limitation on Enrollment: Eligibility for independent study. Individual study or research in some area of medical laboratory technology of particular interest to the student.

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