

DACUM Research Chart for Forensic Biologist

DACUM Panel

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"Professional Competency Certification in Criminalistics"

Possible job titles for employees within this occupational area include but are not limited to:

- Forensic Biologist
- Forensic Serologist
- Forensic Screener
- Forensic DNA Analyst
- Forensic Scientist
- Criminalist

Duties and Tasks associated with this occupation may not be represented for every job title but should be inclusive of the occupation.

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DACUM Research Chart for Forensic Biologist

Duties		Tasks				
A	Manage Casework Requests	A-1 Review case information	A-2 Develop testing plan	A-3 Coordinate testing with other disciplines	A-4 Address supplemental requests	
B	Perform Evidence Examinations	B-1 Maintain chain of custody (e.g. receive, document, disposition)		B-2 Inventory evidence items	B-3 Address case discrepancies	B-4 Document evidence (e.g. photos, notes, sketches)
C	Process DNA Samples (e.g. Extraction through DNA Typing)	C-1 Perform non-differential extractions (e.g. robotic, manual)		C-2 Perform differential extractions (e.g. robotic, manual)		C-3 Quantify DNA extracts
D	Interpret DNA Typing Results	D-1 Assess quality of DNA typing controls	D-2 Assess quality of DNA typing samples	D-3 Troubleshoot DNA typing data (e.g. re-amplifications, re-injections)		D-4 Eliminate DNA process artifacts
E	Publish Examination & Interpretation Results	E-1 Write draft report (e.g. serology and/or DNA)		E-2 Conduct technical review	E-3 Conduct administrative review	E-4 Address review issues (e.g. technical, administrative)
F	Participate in the Legal Process	F-1 Address Discovery requests	F-2 Address subpoenas	F-3 Participate in pre-trial conferences	F-4 Provide testimony (e.g. depositions, court)	
G	Perform QA/QC Responsibilities	G-1 Prepare work area	G-2 Perform instrument maintenance	G-3 Prepare laboratory reagents	G-4 Verify reagent quality	G-5 Participate in proficiency testing
H	Participate in Personal Professional Development	H-1 Review current literature	H-2 Complete continuing education activities (e.g. conferences, workshops, webinars)		H-3 Conduct presentations (e.g. posters, talks)	H-4 Participate in professional forums (e.g. chat groups, organizations)
I	Provide Professional Training	I-1 Provide laboratory tours	I-2 Demonstrate laboratory techniques	I-3 Provide instructional materials (e.g. brochures, video, articles)		I-4 Conduct instructional classes
J	Conduct Research & Development	J-1 Evaluate new methodologies	J-2 Validate new methodologies	J-3 Implement new methodologies	J-4 Conduct efficiency projects	J-5 Publish research findings
K	Perform Administrative Tasks	K-1 Order laboratory supplies	K-2 Participate in laboratory meetings (e.g. staff, QA, unit)	K-3 Complete timesheets	K-4 Respond to daily inquiries (e.g. email, phone calls)	K-5 Prepare travel requests

B-5 Perform tests for blood (e.g. presumptive, confirmatory)		B-6 Perform tests for semen (e.g. presumptive, confirmatory)		B-7 Perform test for miscellaneous body fluids (e.g. saliva, sweat, urine)		
C-4 Interpret quantitation results	C-5 Normalize DNA samples (e.g. concentration, dilution)		C-6 Perform DNA amplifications (e.g. autosomal-STR, Y-STR, mitochondrial DNA)		C-7 Perform DNA typing (e.g. CE run, data collection)	
D-5 Determine number of DNA contributors	D-6 Deduce DNA contributors	D-7 Compare DNA contributors (e.g. knowns, evidentiary samples)		D-8 Calculate sample statistics (e.g. RMP, LR, counting method)		D-9 Determine CODIS eligibility of profiles
E-5 Communicate technically reviewed results (e.g. written, verbal)		E-6 Issue final report				
G-6 Review laboratory manuals (e.g. evaluate, revise)	G-7 Monitor expert testimony	G-8 Participate in corrective action process	G-9 Participate in preventative action process	G-10 Participate in laboratory audits	G-11 Participate in performance review process	G-12 Perform contamination prevention procedures
H-5 Receive professional training (e.g. programs, mentorship)		H-6 Attain professional certification	H-7 Complete supplemental formal education (e.g. courses, degrees)		H-8 Conduct laboratory audits	

Duties	Tasks	→				
A	Manage Casework Requests					
B	Perform Evidence Examinations	B-8 Perform microscopic examinations (e.g. hair, cells)	B-9 Collect samples from evidence (e.g. swabs, cuttings)	B-10 Prepare samples for DNA processing		
C	Process DNA Samples (e.g. Extraction through DNA Typing)					
D	Interpret DNA Typing Results	D-10 Enter profiles into CODIS	D-11 Evaluate CODIS matches	D-12 Address additional evidence testing		

Acronyms

- ALS – alternate light source
- ANAB – ANSI National Accreditation Board
- CE – capillary electrophoresis
- CODIS – Combined DNA Index System
- DNA – deoxyribonucleic acid
- ISO – International Organization of Standardization
- LR – Likelihood ratio
- MPS – massively parallel sequencing
- M-Vac – microbial vacuum system
- PPE – personal protective equipment
- QA – Quality assurance
- QAS – FBI Quality Assurance Standards
- QC – Quality control
- RMP – random match probability
- RNA – ribonucleic acid
- STR – short tandem repeat
- SWGDM – Scientific working group for DNA analysis methods

Worker Behaviors (Attitudes/Traits)

- Professional
- Ethical
- Flexible
- Maintain confidentiality
- Unbiased
- Confident
- Open-minded
- Common sense
- Calm under pressure
- Analytical
- Accurate
- Precise
- Detail oriented
- Quality oriented
- Goal oriented
- Honest
- Cooperative
- Personal Drive
- Focus
- Sense of humor
- Humility
- Detached

General Knowledge and Skills

Biology (molecular, cellular)
Chemistry
Genetics
Population Genetics
Statistics
Math
Scientific method
Good laboratory practice (safety, PPE)
Lab policies
Other forensic disciplines
Legal system
Professional standards and guidelines

- ISO 17025
- ANAB
- QAS
- SWGDAM
- LIMS
- CODIS

Skills

Laboratory (pipetting, robotics)
Computer
Communication (oral, written, presentation)
Problem-solving
Multi-tasking
Time management
Interpersonal
Organizational
Critical thinking
Listening
Decision making
Analytical

Future Trends and Concerns

Probabilistic genotyping implementation
MPS
Phenotypic analysis
Secondary transfer
Increased sensitivity of amplification kits
Increased loci in amplification kits/quality of results
Inconsistency in statistical approaches
RAPID DNA processing
Direct-to-DNA
RNA-based body fluid identification
Micro-fluidic analysis
Fired cartridge case submissions
Sexual assault kit backlog
Retention of staff

Tools, Equipment, Supplies and Materials

Thermal cyclers (real-time, standard)
Genetic analyzer (CE, sequencer)
Gel electrophoresis equipment
Liquid handlers
Extraction robots
Centrifuges
Incubator
ALS instrument
Vortex
Sample collection instrument (M-Vac)
Microscope
Stereomicroscope
De-ionized water
Storage locker
Temperature verification system
Cleaning supplies
Computer
Printer
Server
Internet access

Refrigerator
Freezer
Fume hood
Autoclave
Cross-linker
Camera
Balance
pH meter
Heat block
Vacufuge
Chemicals
Enzymes
Reagents
Safety data sheets
Log books
Office supplies
Post-its
Library (books, journals)
Money

Computer software programs

- data collection
- mixture interpretation
- Microsoft Office
- photo documentation
- data analysis
- LIMS
- quality assurance
- CODIS

General lab supplies

- pipettes
- tubes
- plates
- tips
- tape
- kimwipes
- thermometer

PPE

- lab coat
- goggles
- gloves
- hair net
- mask

Examination tools

- scissors
- scalpels
- slides
- swabs
- drill/drummel

Test kits

- serology
- extraction
- quantitation
- amplification