

ACVR Diagnostic Imaging Residency Training Program Application

This application is required for institutions desiring ACVR accreditation of a new residency training program and for institutions requesting re-accreditation of an existing program. Before beginning the application process, all applicants should review the most recent version of the [ACVR Residency Program Essential Training Standards and Requirements](#) (RPE) document (accessed from the Essentials Homepage) in detail. Use the RPE as a reference when completing the application form, as the contents you provide herein will be evaluated by the Residency Standards and Evaluation Committee (RSEC) against the published RPE standards. This application form follows the headings of the RPE. All terms used in this application have same definitions as those in the RPE, and no information provided in the application form itself will supersede that published in the RPE. During the application review process, the Chair or Assistant Chair of the RSEC may contact the applicant for additional information or clarification.

***Note: If you wish to save your submission and complete it later, click the save button located at the bottom of the pages. You will be emailed a link to complete your form at a later date.**

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Program Summary

The Residency Director of the program is expected to be the primary applicant and contact person for this application. The Residency Director must be located at the primary training institution.

Institution Name	Colorado State University
Residency Program Director Name	Linda Lang
Residency Program Director Email	linda.gail.lang@colosate.edu

Program Type

What type of residency program is being requested?	Traditional Residency Program
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If approved, what is the proposed start date of this residency program?	Saturday, January 1, 2022
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Objectives

Succinctly state the objectives of the training program.

The residency training program is designed to provide supervised training in diagnostic imaging in an atmosphere conducive to learning clinical diagnostic imaging with an introduction to clinical investigation. The residency is also designed to prepare the trainee for certification by the American College of Veterinary Radiology. The residency is designed to provide thorough training in small and large animal radiology, ultrasound, nuclear scintigraphy, computed tomography, and magnetic resonance imaging.

Training Period

What is the total length of the training program? 36

What is the anticipated length of supervised clinical training a resident will experience during this program? 31

Will the resident(s) in this program be eligible to take the ACVR Preliminary Exam in September of their third year? Yes

What are the responsibilities of the resident(s) during non-clinical portions of the program?

Off clinic time is spent on clinical investigation projects, board exam preparation, conference attendance, etc. Residents are allowed 10 days of vacation per year. Vacation time is considered in off clinic time allotment.

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Direction and Supervision

When calculating time commitment in this section, you may consider a 100% (full time) duty schedule to consist of 48 weeks per year with 8 hours per day or 40 hours per week.

Residency Director

Please review the Residency Director requirements and responsibilities in the [ACVR Residency Program Essential Training Standards and Requirements](#) (RPE) document. Note that the Residency Director will be required to provide at least 24 weeks of clinical duty per year in primary support of residents in this program and to meet all other qualifications of a Supervising Diplomate.

Is the applicant Residency Director for this program prepared to meet these requirements? Yes

What percentage of the Residency Director's time is committed to clinical service at the primary training institution? 57

How many weeks per year will the Residency Director be on clinical service and teaching residents at the primary training institution? 29

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Additional Training Diplomates

Please review the definitions and responsibilities of [Supervising Diplomate and Supporting Diplomate](#) in the RPE document. Note that Supervising Diplomates will be required to provide at least 10 weeks of clinical duty in primary support of residents in this program, and are expected to participate in all facets of residency training. Supporting Diplomates aid in residency training, but provide support that is limited, as by modality (e.g. only works in ultrasound), time commitment (e.g. clinical duty < 10 weeks per year), or other constraints that prevent them from qualifying as a Supervising Diplomate.

Provide a copy of affiliation agreements with any diplomates that are located at an external institution (see Affiliation Agreement item at the end of this section).

Excluding the Residency Director, please list all training diplomates who will act as Supervising Diplomates of this residency program. Indicate the approximate number of hours per year each supervisor will be scheduled on clinical duty with primary support of residents and, if applicable, any specific areas of instructional responsibility (e.g. trains mostly in small animal, trains mostly in MRI, etc). If a 'Supervising Diplomat' position will be comprised of multiple radiologists, please list the cohort as a single entity or institution for this question (e.g. "teleradiologists" or private institution name)

Name: Angela Marolf

Hours/Year: 920

Specific Areas and/or Limitations of Instructional Responsibility: Clinical service in small animal Radiology, CT, MRI, Nuclear medicine

Name: Elissa Randall

Hours/Year: 920

Specific Areas and/or Limitations of Instructional Responsibility: Clinical service in all areas of small animal diagnostic Imaging

Name: Alex Ohlendorf

Hours/Year: 1560

Specific Areas and/or Limitations of Instructional Responsibility: Clinical service in all areas of small animal diagnostic Imaging

Name: Myra Barrett

Hours/Year: 780

Specific Areas and/or Limitations of Instructional Responsibility: Clinical service in large animal diagnostic imaging

Name: Kurt Selberg

Hours/Year: 1040

Specific Areas and/or Limitations of Instructional Responsibility: Clinical service in large animal diagnostic imaging

Please list all training diplomates who will act as Supporting Diplomates of this residency program. Indicate how many hours per year each Supporting Diplomat will be scheduled on clinical duty with primary support of residents and any specific areas of instructional responsibility and/or limitations in the scope of this support (e.g. only trains residents in

Name: Lynn Griffin

Hours/Year: 192

Specific Areas of Instructional

ultrasound, does not participate in large animal training, does not finalize imaging reports, etc).

Responsibility: Pet/CT;
Supports resident research

In addition to ACVR/ECVDFI Diplomates, the program must arrange for the resident(s) to have direct access to specialists in other areas. Please identify one member in each of the specialty colleges listed below that has agreed to support this program through clinical activity that allows regular interactions between the specialist and the diagnostic imaging residents (e.g. discussion of diagnostic work up, imaging findings, or patient outcomes, and/or participation in interdisciplinary rounds, etc). Indicate whether the specialist is located on-site at the primary institution at an external institution. Provide a copy of affiliation agreements with any non-ACVR/ECVDFI diplomates that are located at an external institution (see Affiliation Agreement section at the end of this application). Upon completion of this application, the below individuals will receive an email requesting acknowledgement of their support of your residency program.

ACVIM Member Name	Sarah Shropshire
ACVIM Member Institution	Colorado State University
ACVIM Member Email	Sarah.Shropshire@colostate.edu
ACVS Member Name	Sarah Marvel
ACVS Member Institution	Colorado State University
ACVS Member Email	Sarah.Marvel@colostate.edu
ACVP Member Name	Christine Olver
ACVP Member Institution	Colorado State University
ACVP Member Email	Christine.Olver@ColoState.EDU

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Resident:Supervising Diplomate Ratio

The number of residents in the program cannot exceed twice the number of Supervising Diplomates **on-site**. Remote Supervising Diplomates will not count when calculating the maximum residents allowed in a given program.

What is the maximum number of imaging interns you will have enrolled in this training program at any given time?

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Facilities

Review the Facility Requirements listed in the RPE document. Note also that residents should have opportunities to be involved with image acquisition and protocol set-up. Does this residency training program provide on-site access to modern equipment for the following modalities?

Digital or Computed Radiography

Yes

Fluoroscopy	Yes
Ultrasound with Doppler Capability	Yes
MRI	Yes
Fan-beam CT	Yes
Nuclear scintigraphy	Yes

Briefly describe how this program meets the facility requirements, including the specific type of CT and MRI units available. Explain how your program will train residents in modalities for which equipment is not located on site, providing affiliation agreements if applicable. (see Affiliation Agreement item at the end of this section)

The facilities at the CSU Veterinary Teaching Hospital reflect state-of-the-art diagnostic imaging. The diagnostic imaging department is completely filmless and digital with an electronic medical record system (EMR) with RIS capabilities and PACS system (iSite Phillips). Diagnostic imaging has the following assigned rooms:

Radiology:

Radiology:

Large Animal 1 Examination rooms

Small Animal 2 Radiology, 1 fluoroscopy Examination rooms

Ultrasound: 4 Examination rooms (2 small animal general, 1 small animal musculoskeletal, 1 large animal)

CT 1 Examination room, 1 control room, and 2 equipment rooms

MRI 1 Examination room, 1 control room, 1 reading room and 1 equipment room

Nuclear Medicine 2 Rooms Diagnostic, 2 wards, 1 radiopharmaceutical lab

I-131 Facility 1 ward, 1 ante-room

Equipment:

Small Animal Radiography

800 mA Siemens Multix Top/Vertex Solitaire machine, with four way float top elevator table, Eklin RapidStart Clinical Digital Radiography System.

Small Animal Radiography

Toshiba KXD-80F, 800 mA, 180 KW, microprocessor controlled generator, with a tilting and floating table.

An overhead suspended X-ray tube of 150 kV capacity interlocking capability with a fine bucky grid. Eklin RapidStart Clinical Digital Radiography System.

Small Animal Special Procedure Room

Philips Veradius Neo with Flat Detector.

A C-Arm for fluoroscopy examinations, and digital imaging X-ray tube.

One pressure injector: MedRad Arterion Mark 7

IDI table with floating top

Large Animal Radiography

One overhead ceiling-suspended longitudinal and transverse rail systems to support two telescoping cranes for high powered Vertex X-ray tube and a catapult bucky grid with interlocking capability at set distances and move as a unit or independently.

Universal Canon Digital Radiography System with Cesium Iodide 14x17 wireless active capture panel,

and Cesium Iodide 11x14 wireless active capture panel.
High powered ultra high heat capacity Vertex Rad 92 X-ray tube
CPI Indico 100 - 100 kw generator, 800 mA

In addition:

One Minray 80+ port with Eklin Mark III Digital System
One Sound portable generator unit 90+

Ultrasound:

Toshiba Aplio 500 (2)
Toshiba I700 (Equine)
GE Logiq NextGen

Computer Tomography/PET

Philips Gemini TF Big Bore 16 slice PET/CT Scanner
Siemens Somatom Force-Dual source CT 128 slice CT
Siemens Definition AS 64 slice (in adjacent research facility, limited clinical use)

Magnetic Resonance

GE 1.5 Tesla 9.0 LX MRI scanner with Multinuclear spectroscopy
Siemens Skyra 3T (in adjacent research facility, predominantly used for equine MR and research)

Nuclear Medicine:

SA: Digital Siemens E.Cam; Dual head
LA: Digital Omega Gamma Camera with Mirage Acquisition/Processing Station.
Dicom compliance

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Clinical Resources and Training Content

Review the clinical resource and training content requirements listed in the RPE document

What is the average annual caseload at the primary institution over the past 3 years? This number will include all patient visits whether or not they contribute to the annual imaging caseload. 42837

What is the average annual imaging caseload at the primary institution over the past 3 years? Each body region imaged for a given patient (e.g. thorax, abdomen, spine, etc) will count as a single study. 15157

What is the average annual imaging caseload at the primary institution over the past 3 years in the following categories?

Small animal radiology	8432
Large animal radiology	1345
Abdominal ultrasound	2347
Non-abdominal ultrasound	1093

Computed tomography	1297
Magnetic Resonance Imaging	468
Nuclear scintigraphy	121
Other (Specify)	52

Indicate the approximate species breakdown of the imaging caseload at the primary institution in the following categories:

Small animals (canine, feline): 82

Large animals (equine, bovine, porcine, etc.): 13

Avian, Exotic, and Wildlife animals: 5

Which of the following types of imaging cases will the resident(s) have direct, on-site exposure to at the primary institution during the residency program?

Echocardiography

No

Large animal ultrasound

Yes

Nonabdominal small animal ultrasound (i.e. cervical, musculoskeletal)

Yes

Food/fiber animal imaging

Yes

Exotics imaging

Yes

Teleradiology/Referral imaging

No

Explain how the resident(s) in this program will gain experience in any of the above types of imaging cases that are NOT available at the primary institution. Provide affiliation agreements, if applicable. (see Affiliation Agreement item at the end of this section).

Echocardiography is performed by the cardiology service. The radiology residents do not perform echocardiography on clinical patients. The residents have access to echocardiography images and reports on the PACS and EMR. They also take an echocardiography course as part of the Master's program that involves didactic lectures and labs with hands-on echocardiography.

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What percentage of the total imaging caseload at the primary institution results in a written imaging report being generated by either the residents or the training radiologist diplomates in this program?
100

What percentage of the preliminary reports generated from the imaging caseload are initially produced by the resident(s) in this program? 99

Does this institution concurrently support the training of diagnostic imaging interns? Yes

If yes, indicate the maximum number of imaging interns the institution will train concurrently, what percentage of the preliminary reports generated from the imaging caseload will be initially produced by the intern(s), and how this affects the resident imaging report caseload.

3%. We have an imaging intern for the period of June 2020-June 2021. This was a temporary position for 2020-21 and is not intended to be continued or repeated in the future. The main focus of the internship is image acquisition, development of teaching materials for students, and limited clinical service (4-6 weeks on ultrasound, assignment to radiology as needed when residents are off on vacation/off clinic time or in class). The intern "phantom-writes" additional cases separately that do not generate the official report.

What percentage of resident-generated reports are reviewed by training diplomates prior to finalization of the report? 100

What is the average turnaround time for resident-generated preliminary reports to be finalized by training diplomates?

~12-24 hours

What percentage of all imaging reports (resident and diplomate generated) is finalized and available to requesting clinicians within 48 hours after the exam is submitted for radiologist consult? 92

For each category below, calculate the approximate number of cases that a single resident will interpret at the primary institution with radiologist feedback during the course of the entire residency program. These numbers should be calculated using the annual imaging caseload adjusted to include only those with written reports generated by the residents. In general, this number should then be divided by the total number of residents in a program during a given year.

If external rotations for the resident(s) are employed to increase the resident caseload in any given category, please be sure to upload affiliate agreements that include the expected number of reports that residents can expect to generate (with radiologist feedback) for cases in those categories.

Small animal radiology 3674

Large animal radiology 345

Abdominal ultrasound 1006

Non-abdominal ultrasound 290

Computed tomography 523

Magnetic resonance Imaging 164

Nuclear scintigraphy	40
Other (specify)	PET/CT 22

How many ultrasound exams will a single resident perform with radiologist supervision and feedback during the course of the entire program? Scans for which the resident writes a report but does not acquire images are excluded.	1083
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Do residents in this program have ample hands-on training and practice opportunities to become proficient in the performance of ultrasound guided fine needle aspirates and biopsies?

Yes

Please indicate whether this training program includes formal courses in any of the following topics:

Radiobiology

Yes

Nuclear Medicine

Yes

Ultrasonography

Yes

Computed Tomography

Yes

Magnetic Resonance Imaging

Yes

Other

Yes

Briefly describe the formal courses that are available for the resident(s) in this program by indicating the institution, course title, course number, and credit hours as well as any other relevant information. For any topics for which formal course work is not provided for the resident(s), please explain how educational objectives in these topics will be met.

CSU ERHS 712 Medical Imaging Physics - 3 credit hours

CSU ERHS 450 Radiation Biology - 3 credit hours or ERHS 550 Principles of Radiation Biology - 5 credit hours

CSU ERHS 705 Advanced Small Animal Diagnostic Imaging - 4 credit hours (System-based approach to diagnostic imaging of small animals of all imaging modalities (radiography/fluoroscopy, ultrasonography, computed tomography, magnetic resonance imaging, nuclear medicine)

CSU ERHS 706 Advanced Equine Diagnostic Imaging - 2 credit hours (Diagnostic imaging of large animals including all modalities (radiography/fluoroscopy, ultrasonography, computed tomography, magnetic resonance imaging, nuclear medicine)

CSU VM 665 Echocardiography in Veterinary Medicine - 3 credit hours

CSU VM 562 Applied Data analysis - 3 credit hours (statistics, research study design and data analysis)

Do residents have access to a majority of the written pathology reports that are generated from patients included in this imaging caseload?

Yes

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Research Environment

Review the Research Requirements listed in the RPE document.

Over the last five years, what is the average number of peer reviewed publications on which the training diplomates (Supervising and Supporting diplomates) of this program are included as authors? (total number of publications in last 5 years among all training diplomates divided by the number of training diplomates) 16

How many peer-reviewed publications are expected of a resident completing the program? 1

If this is an established program, what percentage of residents have made formal research presentations at the annual ACVR or equivalent national meeting? 82

Briefly describe if/how residents are encouraged to engage in investigative work and what mechanisms are in place for training diplomates to support this work.

All residents are expected to perform one investigative research project as part of the combined residency and Master's program(prospective or strong retrospective). In the first year, residents choose a mentor with similar interests and choose a research project that aligns with their particular interests. We have five tenure track diagnostic imaging faculty with a research component to their appointment (time off clinics dedicated to research) to help mentor the resident with design and performance of said research project. Collaboration with other specialists is readily available. Residents will have a committee for the master's program to also help mentor them through this process. Residents are encouraged to write an outline and do background research in the first year of the project. Discounted imaging costs for research studies and faculty start-up funds are available to aid in project funding. Residents are also encouraged to apply for ACVR or other grants for funding. Residents take a graduate level course (VM 562 - Applied Data Analysis) that focuses on data management, application and interpretation of statistical analysis, and reporting of results for students in health science fields. There is a large imaging caseload and archive to support prospective and retrospective research.

Educational Environment

Review the Educational Environment expectations listed in the RPE document.

Briefly describe the type and extent of teaching opportunities that are provided to the resident throughout the training program.

Residents and faculty share responsibility of teaching rounds to senior students (2 week rotation, 9 case based rounds sessions, 2 ultrasound labs). Residents will lead small group discussions on the provided cases. Ultrasound labs are primarily taught by technologists but residents will teach ultrasound rounds when technologist is unavailable. Didactic lectures to DVM students are rare, and generally involve reviews, case presentations. Residents have the opportunity to teach an ultrasound lab to the DVM Diagnostic imaging club and also provide didactic lecturing - optional.

Briefly describe the nature and scope of the teaching file available to the resident(s) in this program and how it is maintained/updated.

Radiology, ultrasound, CT, MR, and nuclear medicine cases are available for resident training. These teaching files are kept current and updated regularly with material from the known case conference rounds. These contributions are provided by the supervising faculty radiologists (who share KCC responsibilities equally) and by the residents.

There is also a file of articles compiled for reading that are selected to assist knowledge of the ACVR objective list. This is kept up to date by the residents who contribute articles to the file.

Interesting cases are also archived in the PACs system by modality.

How many Known Case Conferences are conducted annually? 25

Describe how the resident(s) in this program will attain direct and consistent medical library access and/or how they will access research tools and medical literature including the suggested references listed in the ACVR Preliminary Examination study guide.

There is a medical library within the veterinary teaching hospital, where the program is conducted. Residents also have access to the entire CSU library system electronically.

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Evaluation and Protection of Residents

Did all of your current residents adequately complete the last 6 months of training?

Yes

List the current members of the resident review committee.

All radiology faculty members participate in the review process of each individual resident. At least four faculty members fill out surveys to assess each resident's evaluations and the data is collated.

Linda Lang, Angela Marolf, Elissa Randall, Myra Barrett, Kurt Selberg, Alex Ohlendorf

Describe the internal mechanisms in place at your institution to protect the resident(s) if personal or organizational conflicts arise. Include the management hierarchy for residents and procedures by which residents would report workplace misconduct.

If progress towards completion of the Master's degree/Residency Program is deemed unsatisfactory by the Radiology faculty, a statement to this effect, including reasons for the unsatisfactory evaluation and suggested methods for correction of deficits will be provided to the resident, the resident's advisor, graduate committee, and to the Department Head. Deficiencies must be corrected within 3 months of the date of the statement of unsatisfactory progress. If deficiencies are not corrected, a recommendation to terminate the resident's program will be made.

If there are interpersonal conflicts, the residents resources include their major advisor, the residency director, clinical service chief, and the human resources department. Hierarchy: advisor and/or resident director-> Diagnostic Imaging service chief -> department head.

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Appendix

Please provide the following information regarding preliminary and certifying board exam pass rates for

residents in your program over the past five years.

Preliminary Board Exam Pass Rate

2020

Number Of Prelim Board Eligible Residents: 2

Number of Residents That Took Prelim Exam: 2

Number of Residents That Passed On 1st Attempt:
2

Number of Residents That Passed After Multiple
Attempts: 0

Number of Residents That Have Not Passed: 0

2019

Number Of Prelim Board Eligible Residents: 2

Number of Residents That Took Prelim Exam: 2

Number of Residents That Passed On 1st Attempt:
2

Number of Residents That Passed After Multiple
Attempts: 0

Number of Residents That Have Not Passed: 0

2018

Number Of Prelim Board Eligible Residents: 2

Number of Residents That Took Prelim Exam: 2

Number of Residents That Passed On 1st Attempt:
2

Number of Residents That Passed After Multiple
Attempts: 0

Number of Residents That Have Not Passed: 0

2017

Number Of Prelim Board Eligible Residents: 2

Number of Residents That Took Prelim Exam: 2

Number of Residents That Passed On 1st Attempt:
2

Number of Residents That Passed After Multiple
Attempts: 0

Number of Residents That Have Not Passed: 0

2016

Number Of Prelim Board Eligible Residents: 2

Number of Residents That Took Prelim Exam: 2

Number of Residents That Passed On 1st Attempt:
2

Number of Residents That Passed After Multiple
Attempts: 0

Number of Residents That Have Not Passed: 0

Certifying Board Exam Pass Rate

2020

Number of Certifying Board Eligible Residents: 2

Number of Residents That Took Certifying Exam: 2

Number of Residents That Passed On 1st Attempt:
2

Number of Residents That Passed After Multiple
Attempts: 0

Number of Residents That Have Not Passed: 0

2019

Number of Certifying Board Eligible Residents: 2

Number of Residents That Took Certifying Exam: 2

Number of Residents That Passed On 1st Attempt:
2

Number of Residents That Passed After Multiple
Attempts: 0

Number of Residents That Have Not Passed: 0

2018

Number of Certifying Board Eligible Residents: 3

Number of Residents That Took Certifying Exam: 3

Number of Residents That Passed On 1st Attempt:
2

Number of Residents That Passed After Multiple
Attempts: 1

Number of Residents That Have Not Passed: 0

2017

Number of Certifying Board Eligible Residents: 2

Number of Residents That Took Certifying Exam: 2

Number of Residents That Passed On 1st Attempt:
2

Number of Residents That Passed After Multiple
Attempts: 0

Number of Residents That Have Not Passed: 0

2016

Number of Certifying Board Eligible Residents: 1

Number of Residents That Took Certifying Exam: 1

Number of Residents That Passed On 1st Attempt:
0

Number of Residents That Passed After Multiple
Attempts: 1

Number of Residents That Have Not Passed: 0

Program Schedule

Upload a schedule for your residents that outlines their clinical and non-clinical work over the course of the residency program. This may be a master schedule or duty roster for your entire radiology section, if desired. If available, an example weekly or monthly rounds schedule can also be included.

Program Schedule



Spring 2019 Schedule Final.pdf



Weekly rounds.pdf

Affiliation Agreements

Upload digital copies of any affiliation agreements that have not been included elsewhere in this document. Refer to the RPE document for an explanation of what information should be included in such agreements.



MRI Rounds to Supplementpdf