ACVR | Diagnostic Imaging

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

NC State University

Residency Program Director Name

Gabriela Seiler

Residency Program Director Email

gsseiler@ncsu.edu

Program Type

What type of residency program is being requested?

Traditional Residency Program

If approved, what is the proposed start date of this residency program?

Saturday, January 1, 2022

Objectives

Succinctly state the objectives of the training program.

To provide training in large and small animal radiology, ultrasound, nuclear medicine, computed tomography and magnetic resonance imaging to fulfill the requirements of the American College of Veterinary Radiology (ACVR) and be able to perform successfully in academic or specialty practice.

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?

30

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?

The 6 months off-clinics is spent preparing for the ACVR board examinations, completing a research project, vacation (12 days per year), and on externships (optional).

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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?

50

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

24

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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).

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In addition to ACVR/ECVDI 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/ECVDI 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   Karyn Harrell

ACVIM Member Institution   NC State University

ACVIM Member Email   kaharrell@ncsu.edu

ACVS Member Name   Kyle Mathews

ACVS Member Institution   NC State University

ACVS Member Email   kmathews@ncsu.edu

ACVP Member Name   Keith Linder

ACVP Member Institution   NC State University

ACVP Member Email   kelinder@ncsu.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?   9

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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)

Small Animal Radiology
● Room 1: Siemens Multix Top, Ceiling mounted unit. 80KW generator with Canon CXDI 50G Flat panel digital system.
● Room 2: Siemens Digital Fluoroscopy. 80 KW generator and Canon CXDI 50G flat panel digital system.
● Room 3: Siemens Multix Top Ceiling mounted unit. 80KW generator with Canon CXDI 50G Flat panel digital system.
● Siemens Neurostar Biplanar Fluoroscopy/Digital Angiography with Infimed digital image acquisition, storage and processing

Large Animal Radiology
● Ceiling mounted x-ray tube with mechanical and electric interlocking to an autotracking image plate holder and Canon CXDI 50G and 1417 CDXI -710C digital flat panel.
● Ceiling mounted x-ray tube with extension capabilities to floor level with Canon CXDI – 810C digital flat panel.
● MinX-ray portable generator interfaced with either CXDI 50G, CDXI -710C or CXDI – 810C digital flat panel.
Ultrasonographic equipment:
● Two Canon Aplio i700 Ultrasound Machines with two 11MC4 (microconvex), two i8C1 (convex), two i18L5X (linear matrix) and one 17LH7 (small linear "hockeystick") probes.
● 1 Canon Aplio i500 Ultrasound Machine with the following probes: 10C3 (convex), 14L5 (linear), 6C1 (convex), 11MC4 (microconvex), and 18L7 (linear).
● Elastography, Fusion, Contrast Ultrasound and 3D imaging technology.
● 6 Sonoscape Ultrasound Machines for Teaching each with a linear and microconvex probe.

CT equipment:
● Siemens Perspective 64, Multislice helical scanner
● Siemens Sensation 16, Multislice helical scanner
● Siemens Wizard CT workstation

Nuclear medicine equipment:
● Technicare camera retrofitted with digital imaging chain interfaced with PC based Mirage software
MRI equipment:
3.0T Siemens Skyra MRI suite. Unit configured for small animal and equine. Radiology Information System and PACS
● Web based Fuji RIS fully integrated with IBM Merge PACS with IBM Merge V8.0 Halo Viewer and ClientOutlook eUnity html5 viewer.

- Multiple Merge eFilm V4.2 workstations
- Multiple 3 monitor workstations with dual NEC 3MP monochrome monitors or dual Dell 4K color monitors.

Miscellaneous
- Fuji CR System
- Multiple workstations with NEC 3MP monochrome monitors.

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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.   33597

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.   18453

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

Small animal radiology   9457

Large animal radiology   1214

Abdominal ultrasound   4825

Non-abdominal ultrasound   774

Computed tomography   1217

Magnetic Resonance Imaging   631

Nuclear scintigraphy   334

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

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   Yes

Large animal ultrasound   Yes

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

Food/fiber animal imaging   Yes

Exotics imaging   Yes

Teleradiology/Referral imaging   Yes

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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?   99

What percentage of the preliminary reports generated from the imaging caseload are initially produced by the resident(s) in this program?   95

Does this institution concurrently support the training of diagnostic imaging interns?   No

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?

48 hours, can extend to 96 hours if reduced faculty numbers due to vacation, conferences etc.

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?   75

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   3152

Large animal radiology   405

Abdominal ultrasound   1608

Non-abdominal ultrasound   255

Computed tomography   406

Magnetic resonance Imaging   210

Nuclear scintigraphy   111

Other (specify)   500 radiology, 42 ultrasound, 36 CT and 36 MR cases are provided (anonymized prior cases) for all residents to write reports to boost caseload if needed. Faculty will correct the reports.

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.   1863

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   No

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.

The above topics are covered in a formal 2 credit course the radiology residents audit: Radiology Resident Physics Course - offered at UNC- Chapel Hill School of Medicine.
MRI is also taught in the form of weekly rounds. At this rounds session, faculty radiologists discuss approximately 10-15 cases, and imaging protocols, as well as differential diagnoses and image interpretation. The Neurology service joins these rounds once a month to provide additional input.
All topics are discussed in weekly Board Objective Rounds over the course of a year.
Residents attend courses such as Nuclear Medicine Short Course, MRI in practice, LA imaging course, as available and offered outside of NC State.

Do residents have access to a majority of the written pathology reports that are generated from patients included in this imaging caseload?	No

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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)	10
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?	90

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 encouraged to identify an area of research interest or even a specific project at the beginning of their residency. Residents are then matched with one or two faculty members to design the research projects, collect and analyze data and publish a manuscript. Results of the research study are presented at the ACVR conference. The Molecular Biomedical Sciences Department provides basic funding for each resident projects, and depending on the project an ACVR resident research grant proposal is submitted. All training diplomates have off clinics time assigned to pursue scholarly activities which includes supervising resident research projects. The college of veterinary medicine employs a full time statistician to provide support.

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.

Each resident is expected to present the findings of his or her research project at the ACVR annual scientific meeting during their third year of training. Each resident is also required to give 1-2 presentations over the course of their training to house officers and faculty on topics relating to diagnostic imaging. Additionally, the residents routinely give two lectures on physics and digital imaging to veterinary students on clinical rotation, and occasional lectures and ultrasound labs to the veterinary students in the RadVets radiology student club. Residents interested in teaching can also volunteer to give lectures in thoracic and abdominal imaging to the incoming intern class.

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

Clinical images from 2002 to present are in a digital format and available through the Radiology Information System (RIS). These cases are indexed by keywords that can be searched in the RIS. Searches in the RIS can be filtered using the report assessments, descriptions, patient signalment and exam type parameters. These cases are directly linked to the PACS system for web-based image retrieval.

How many Known Case Conferences are conducted annually?   49

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.

The William Rand Kenan, Jr. Library of Veterinary Medicine is on-site. All relevant veterinary journals are available online or on-site through the University library. Most reference books are available in radiology, those who are not in the radiology library can be found in the library of the college of veterinary medicine.

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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 for all radiology residents.
Outside mentors:
For Michael Andres: Laura Nelson, DACVS
For Michael Ensor: Adam Birkenheuer, DACVIM
For Mimmi Walther: Kate Bailey, DACVAA
For Esther Farber: Karyn Harrell, DACVIM
For Maura Cicci: Tracy Geiger, DACVIM, DACVR-RO
For Alan Bocage: Sarah Musulin, DACVECC
For Alessandra Hamlin: Allison Kendall, DACVIM
For Linda Dillenbeck: Lauren Schnabel, DACVS, DACVSMR
For Katie Lehman: Timo Prange, DACVS

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.

Evaluations are performed twice a year in December and April and are submitted to the Student Services at North Carolina State University College of Veterinary Medicine. Any instance where a resident "does not meet standards" in any of the evaluation criteria the Faculty Committee of House Officer Programs and Resources (FCHOPR) is notified. Each resident is evaluated by the radiology faculty and has a faculty mentor outside the radiology group. This mentor, as well as the FCHOPR committee, are possible points of contact for the residents should conflicts arise.

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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: 3

Number of Residents That Took Prelim Exam: 3

Number of Residents That Passed On 1st Attempt: 3

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: 3

Number of Residents That Took Prelim Exam: 3

Number of Residents That Passed On 1st Attempt: 3

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: 1

Number of Residents That Took Prelim Exam: 1

Number of Residents That Passed On 1st Attempt: 1

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: 1

Number of Residents That Passed After Multiple Attempts: n/a has not repeated yet

Number of Residents That Have Not Passed: 1 as of now

2019

Number of Certifying Board Eligible Residents: 3

Number of Residents That Took Certifying Exam: 3

Number of Residents That Passed On 1st Attempt: 3

Number of Residents That Passed After Multiple Attempts: 0

Number of Residents That Have Not Passed: 0

2018

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

2017

Number of Certifying Board Eligible Residents: 1

Number of Residents That Took Certifying Exam: 1

Number of Residents That Passed On 1st Attempt: 1

Number of Residents That Passed After Multiple Attempts: 0

Number of Residents That Have Not Passed: 0

2016

Number of Certifying Board Eligible Residents: 3

Number of Residents That Took Certifying Exam: 3

Number of Residents That Passed On 1st Attempt: 3

Number of Residents That Passed After Multiple Attempts: 0

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

EXAMPLE SCHEDULE.xlsx

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.