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International Studies at Monterey  
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# **Research Reactor Practicum**

**Dr. George M. Moore**  
**October 6, 2016**

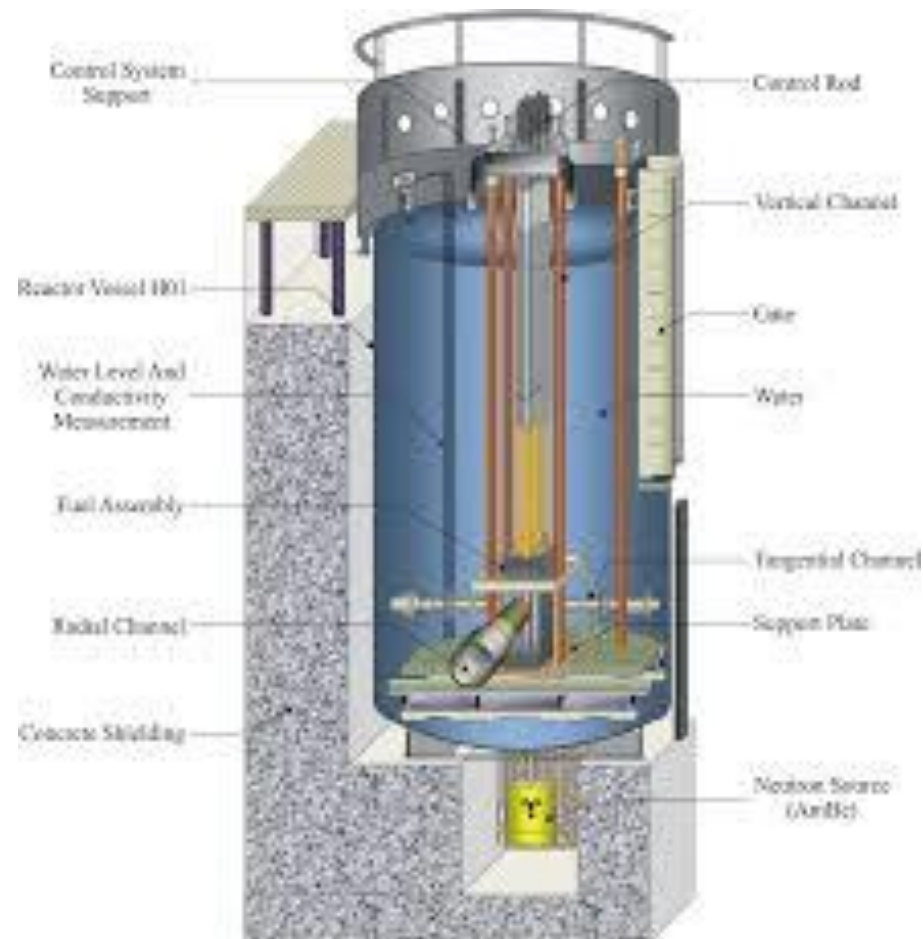


Basic Technical Parameters of VR-1 Reactor The VR-1 Training Reactor (see Fig1) is a pool-type light-water reactor based on enriched uranium with maximum thermal power 1kW and for short time period up to 5kW. The moderator of neutrons is light demineralised water, which is also used as a reflector, a biological shielding, and a coolant. Heat is removed from the core by natural convection. The pool disposition of the reactor facilitates access to the core, setting and removing of various experimental samples and detectors, easy and safe handling of fuel assemblies. Fig 1. Cross section of VR-1 reactor Reactor has been successfully converted from the highly enriched HEU (36%) to LEU (19.7%)



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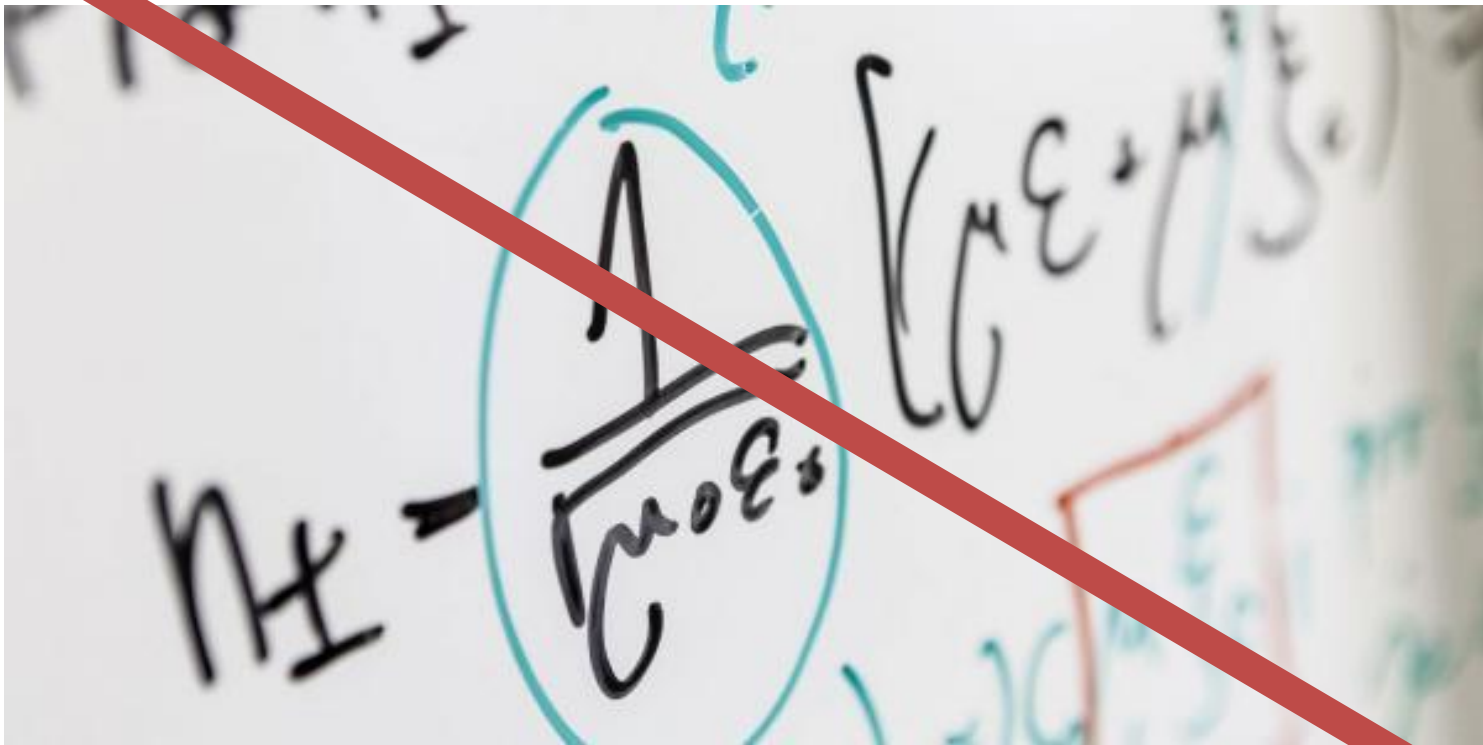
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**CTU-04 – How does a nuclear reactor work?**

**CTU-05 – Construction and operation of research reactors**

**CTU-06 – Construction and operation of nuclear power plants**

**CTU-07 – Nuclear installation - front and back end of the nuclear fuel cycle**  
Nuclear fuel cycle, front and back end



**CTU-08 - Introduction to safe and secure operation of nuclear reactors**

**CTU-09 – Radiation protection and radioactive waste management**

**CTU-10 – Emergency preparedness at a nuclear reactor**

**CTU-11 – Nuclear security at a nuclear reactor**

**CTU-12 – Safeguards at a nuclear reactor**



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**CTU-13 - Neutron detection in practice**

**CTU-14 – Delayed neutrons in practice**

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**CTU-15 – Nuclear safety in practice**

**CTU-16 - Reactor operation in practice**





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**CTU-17 - Radiation monitoring in  
practice**

**CTU-18 - Nuclear security in practice**

**CTU-19 - Safeguards in practice**

**CTU-20 - Neutron activation analysis  
in practice**





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| week 1             | Mon<br>Jan 16 | Tue<br>Jan 17 | Wed<br>Jan 18 | Thu<br>Jan 19 | Fri<br>Jan 20 | Sat-Sun<br>Jan 21-22 |
|--------------------|---------------|---------------|---------------|---------------|---------------|----------------------|
| Morning<br>9-12    | CTU-01        | CTU-06        | CTU-22        | CTU-25        | CTU-26        | Culture<br>program   |
|                    | CTU-04        | CTU-07        | CTU-23        |               |               |                      |
| Afternoon<br>13-16 | CTU-05        | CTU-08        | CTU-24        |               |               |                      |
|                    | CTU-21        | CTU-10        |               |               |               |                      |

| week2              | Mon<br>Jan 23 | Tue<br>Jan 24 | Wed<br>Jan 25 | Thu<br>Jan 26                          | Fri<br>Jan 27                  | Sat-Sun<br>Jan 28-29      |
|--------------------|---------------|---------------|---------------|--|--------------------------------|---------------------------|
| Morning<br>9-12    | CTU-13        | CTU-09        | CTU-11        | CTU-16/ CTU-20**                       | IAEA/CTBTO<br>Visits in Vienna | Return back<br>to the USA |
|                    | CTU-14        |               | CTU-18        |  |                                |                           |
| Afternoon<br>13-16 | CTU-15        | CTU-17        | CTU-12        | CTU-02 and<br>then Travel to<br>Vienna |                                |                           |
|                    |               |               | CTU-19/IAEA*  |  |                                |                           |



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### **CTU-21 - VR-1 research reactor**

Visit of the VR-1 research reactor (low power pool type reactor, 1 KW) at Czech Technical University in Prague, VR-1 reactor utilization and its experimental facilities, D-D neutron generator and its utilization.

### **CTU-22 - LVR-15 research reactor**

Visit of the LVR-15 research reactor (multipurpose high power tank type reactor, 10 MW,) at Research Centre Rez, LVR-15 reactor utilization and its experimental facilities.



### **CTU-23 - LR-0 research reactor**

Visit of the LR-0 research reactor (zero power pool type reactor, NPP fuel characteristics experiments) at Research Centre Rez, LR-0 reactor utilization and its experimental facilities.

### **\*CTU-24 – SURO – National radiation protection institute** *(optional in case of not travelling to Vienna)*

Visit of the SURO – National radiation protection institute – national system for urgent actions in the case of radiological or nuclear accidents, national regulatory body emergency centre, whole body counter, etc.



### **CTU-25 - Temelin /Dukovany nuclear power plant**

Visit of the Temelin nuclear power plant (WWER-1000, PWR, 2x1000 MWe) or the Dukovany nuclear power plant (WWER-440, PWR, 2x500 MWe).

### **\*CTU-26 - Skoda Nuclear machinery** *(optional in case of not travelling to Vienna)*

Visit of the Skoda Nuclear machinery in Pilsen – heavy components course, reactor inner parts course and I&C course, transport and storage casks CASTOR.



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### **Culture program**

Reactor staff will organize sightseeing tour in the old Prague quarters (Prague castle, Charles bridge, Old-town square, etc.) or tour to the famous Karlstejn castle upon the request.

### **Transport from hotel to the reactor**

Walking distance from the hotel to the reactor site.



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