Risk Assessment Form
Cardiff School of Biosciences

IMPORTANT: Before carrying out the assessment, please read the Guidance Notes

1. General Information

Department	Cardiff School Of Biosciences	**Building**	Sir Martin Evans (BIOSI 2)	**Room No**	E/0.14A
Name of Assessor	Dr Anthony J Hayes	**Date of Original Assessment**	30/06/2017	**Assessment No or practical module No**	1

Status of Assessor: Staff ☒ Postgraduate ☐ Undergraduate ☐ Other: (Specify) .....

2. Brief Description of Procedure/Activity including its Location and Duration

Operation and use of 3D printer and finishing of 3D prints

The 3D printer is designed for fused filament fabrication (FFF) 3D printing using a variety of commercially-available filaments including polylactic acid (PLA), ABS (acrylonitrile butadiene styrene), CPE (co-polyester), polyamide (nylon) and polyvinyl alcohol (PVA). All users must be trained and familiar with the risks associated with using these devices.

Mode of operation: Filament is melted and precisely extruded via a print head onto a printing bed and the 3D print is generated layer by layer under control of the supporting software.

The print head can reach temperatures of up to 260°C and the heated print bed of up to 120°C thus there is a risk of burns if care is not taken. During printing no contact should be made with any components of the printing chamber, including the 3D print itself. The printer should be allowed to cool down for at least 30 minutes before removing the print or performing any routine maintenance. The nozzle of the print head is mostly surrounded by an aluminium cover to prevent contact, but care should always be taken when removing prints.

Print progress can be followed using the integral web cam. The 3D print can be paused or aborted at any point during printing either locally or remotely (via a mobile phone app).

When printing in ABS, small concentrations of styrene fumes can be released which can, in some cases cause headaches. Printing in this material should therefore only be under-taken outside normal working hours so that no individuals are at risk.

When finishing the 3D prints with sharp tools, care should be taken to avoid lacerations. The 'stubble' left on the 3D print after the supporting scaffold has been removed can also be sharp and cause cuts. Rubber gloves, lab coat and eye protection should therefore be used when finishing the 3D printed models.

Further information is available here:
https://ultimaker.com/en/resources/16483-safety-and-compliance

2a. Is your work governed by specific legislation i.e:
(Tick as appropriate, see guidance notes)

Human Tissue (HTA-work involving human tissue):	☐	Approval compliance obtained ☐
GM (any genetically modified organism including plant and animals):	☐	Approval compliance obtained ☐
Radiation (radioisotopes, sealed sources):	☐	Approval compliance obtained ☐
Controlled Drugs:	☐	Approval compliance obtained ☐
Non ionising radiation (lasers, magnetism):	☐	Approval compliance obtained ☐
Use of human subjects (Ethics):	☐	Approval compliance obtained ☐

3. Persons at Risk

		Are they		Notes
Staff	☒	Trained	☒	Trained staff/students (unsupervised) and staff/students undergoing training (supervised) are potentially at risk. Untrained users are not permitted access to

Visitor	☐	Disabled	☐	the instrument.
Contractor	☐	Inexperienced	☐	
Students	☒	Competent	☐	
Vulnerable groups	☐			

4. Level of Supervision Notes

None ☐ Constant ☐ Periodic ☐ Training Required ☒	Training is required for independent usage of the 3D printer. Untrained users are not permitted independent access.

5. Will Protective Equipment Be Used? Please give ***specific*** details of PPE

Head ☐ Eye ☒ Ear ☐ Body ☒ Hand ☒ Foot ☐	Protective gloves, labcoat and eye protection should be used when finishing the 3D prints.

6. Is the Environment at Risk? Notes

Yes ☒ No ☐	ABS filament should only be used out of normal working hours to ensure that no one in the area is exposed to potential styrene vapours. Supporting scaffold removed from the finished 3D print should be properly disposed of in domestic waste. Any particulates should be cleaned up using a portable hand held vacuum. Any sharps should be disposed of in a sharps bin – broken fragments of glass should be brushed on to paper and disposed of in a similar fashion.

7. Will Waste be generated? If 'yes' please give details of disposal

Yes ☒ No ☐	Any 3D printing residues, support scaffold or waste filament should be properly disposed of in the domestic waste. Any sharps used to finish the 3D print should be disposed of in a sharps bin.

8. Hazards involved

Work Activity / Item of Equipment / Procedure / Physical Location	Hazard	Control Measures and Consequence of Failure	Likelihood (0 to 5) ×	Severity (0 to 5) =	Level of Risk
3D printing and finishing	Burns	Clear signage to indicate risks. Allow 30 minutes after printing to allow the printer to cool before removing 3D print. Avoid making contact with any components of the printing chamber. Any burns should be irrigated immediately with copious amounts of cold running water.	2	3	3
	Potential headaches/nausea from styrene fumes which may be liberated when printing in ABS	ABS printing should only be undertaken out of hours so no individuals are affected.	1	2	2
	Lacerations from sharps	Lab coat, gloves and eye protection should be used when finishing the 3D prints. Care should be taken when using sharp tools. Lacerations should be reported to the facility manager. Sharps should be disposed of in a sharps bin. A first aid box is available in the area.	2	2	3

9. Chemical Safety (COSHH Assessment)

Hazard	Control Measures	Likelihood (0 to 5) ×	Severity (0 to 5) =	Level of Risk
• Potential headaches/nausea from styrene fumes which may be liberated when printing in ABS	ABS printing should only be undertaken out of normal working hours so that no individuals are affected.	1	2	2

Scoring Criteria for Likelihood (chance of the hazard causing a problem) Likelihood
Scoring Criteria for Severity of Injury (or illness) resulting from the hazard

Likelihood

5	Almost Certain	5	10	15	20	25
4	Very Likely	4	8	12	16	20
3	Likely	4	6	9	12	16
2	Unlikely	2	4	6	8	10
1	Very Unlikely	1	2	3	4	5
		No Injury / Illness	First Aid Required	Minor Injury	Major Injury	Death
	Severity	**1**	**2**	**3**	**4**	**5**

Score Action to be taken:

0-5	Low Risk	No further action needed.
6-9	Medium Risk	Appropriate additional control measures should be implemented
10-25	High Risk	Additional control measures **MUST** be implemented. Work **MUST NOT** commence until such measures are in place. If work has already started it must **STOP** until adequate control measures are in place

10. Source(s) of information used to complete the above e.g Supervisor, Web etc….

WWW, MSDS

11 Additional Control Measures – Likelihood and Severity are the values with the additional controls in place

Work Activity / Item of Equipment / Procedure / Physical Location	Hazard and Existing Control Measures	Additional Controls needed to Reduce Risk	Likelihood (0 to 5) ×	Severity (0 to 5) =	Level of Risk

After the implementation of new control measures the procedure/activity should be re-assessed to ensure that the level of risk has been reduced as required.

12. Action in the Event of an Accident or Emergency

Report to Unit Supervisor/Manager immediately: Dr Anthony J. Hayes (E/0.14A; ext 76611). Follow OSHEU guidance (ext 74910).

13. Arrangements for Monitoring the Effectiveness of Control

Ad-hoc visual checks and periodic review of existing risk assessments. School Safety inspections, internal and external safety audits.

14. Review: This assessment must be reviewed by (date: 30.6.18)

Name of Reviewer:		Date of Review:	
Have the Control measures been effective in controlling the risk?			
Have there been any changes in the procedure or in information available which affect the estimated level of risk?			
What changes to the Control Measures are required?			

15. Signatures for printed copies:

Assessor:	Dr Anthony J. Hayes	Signature:		Date:	30.6.17
Approved by: If assessor inexperienced		Signature:		Date:	
Reviewed by:		Signature		Date:	
Person involved on risk assessment or issued to		Signature		Date:	