## SD4429

※弊会記入欄

様式 A-1 (FY2023)

2024 年 3 月 5 日

1.	学校名·実施責任者氏名:
2.	講師氏名 : Dr. Pengjun LUO
3.	講義補助者氏名:なし
4.	実施日時: 2024 年 3 月 4 日 (月) 11:40 ~ 12:40
5.	参加生徒:年生30_人、年生人、年生人(合計30_人) 備考: <u>(例:</u> 理数科の生徒) 総合理数⊐ースの生徒
6.	講義題目:Fatigue of Metal Structures

サイエンス・ダイアログ 実施報告書

## 7. 講義概要:

Metal fatigue is a type of failure that happens when metal materials experience repeated loads over a period of time. It can lead to unexpected and serious failures without any warning, such as a fan blade breaking off from a jet engine, causing significant damage or even death. Statistics show that metal fatigue is the cause of more than 90% of failures in metal structures, such as bridges, airplanes, and vehicles. Better understanding fatigue issues of metal structures is crucial. Therefore, our research focuses on fatigue life prediction and improvement for steel structures. Our goals are figuring out when a steel structure might fatigue break and discovering effective methods to prolong their work life. This research is important because it helps us create safer, more efficient, and less expensive structures.

## 8. 講義形式:

⊠対面 ・ □オンライン (どちらか選択ください。)

- 1) 講義時間 <u>50 分</u> 質疑応答時間 <u>10 分</u>
- 2) 講義方法(例:プロジェクター使用による講義、実験・実習の有無など)
   プロジェクター使用による講義
- 3) 事前学習

(有)・ 無 (どちらかにOをしてください。)

使用教材 \_\_\_\_事前学習プリント

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Form B-2 (FY2023) Must be typed	Date(日付) 06/03/2024	(Date/Month/Year:日/月/年)	
Activity Repor (サイエン:	t -Science Dialogue F ス・ダイアログ事業 実施報告書	Program-	
Fellow's name(講師氏名):Peng	gjun LUO	(ID No.P 23064 )	
Name and title of the accompanying None	person(講義補助者の職・氏4	名)	
· Participating school (学校名): <u>Hyogo Prefectural Kawanishi Midoridai Senior High school</u>			
Date (実施日時):04/03/202	24	(Date/Month/Year:日/月/年)	
· Lecture title(講義題目): Fatigue of steel	structures		

- Lecture format (講義形式):

- ◆ ⊠Onsite ・ □Online (Please choose one.)(対面 ・ オンライン)((どちらか選択ください。))
- ◆Lecture time(講義時間)\_\_\_45 min (分), Q&A time (質疑応答時間) \_\_\_15 min (分)

Lecture style(ex.: used projector, conducted experiments)

(講義方法 (例:プロジェクター使用による講義、実験・実習の有無など))

PowerPoint being presented by using Projector, small experiment was conducted

- Lecture summary (講義概要): Please summarize your lecture within 200-500 words.

Steel structures are prone to fatigue failure when subjected to cyclic loading conditions. Since more than 90% of mechanical failures of steel structures can be attributed to fatigue, it is particularly important to delve into the fatigue issues of steel structures. I began the lecture by explaining what fatigue failure is, comparing it with the static failure of steel material. Following this, I showed some examples, particularly accidents caused by fatigue failure of steel components, to highlight their significant impacts. To understand why steel structures or components experience fatigue failure, we conducted a small fatigue experiment using a paper clip, bending it repeatedly by hand to illustrate the process. Subsequently, I explained the failure process of the paper clip under repeated bending and extended these concepts to the general fatigue failure process of steel structures and components. I believe this experiment and corresponding explanation provided everyone with a deeper understanding of fatigue failures. In the third part, I introduced a basic method commonly used to predict the fatigue life of steel structures and components—the stress-life (S-N) curve method. I explained how we create SN curves through experiments and how we use them to predict fatigue life. Finally, I introduced some effective methods that can be used to prolong the fatigue life of steel structures and components, particularly those useful for welded structures.

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◆Other noteworthy information (その他特筆すべき事項): None.

- Impressions and comments from the accompanying person (講義補助者の方から、本事業に対する 意見・感想等がありましたら、お願いいたします。): No accompanying person.

